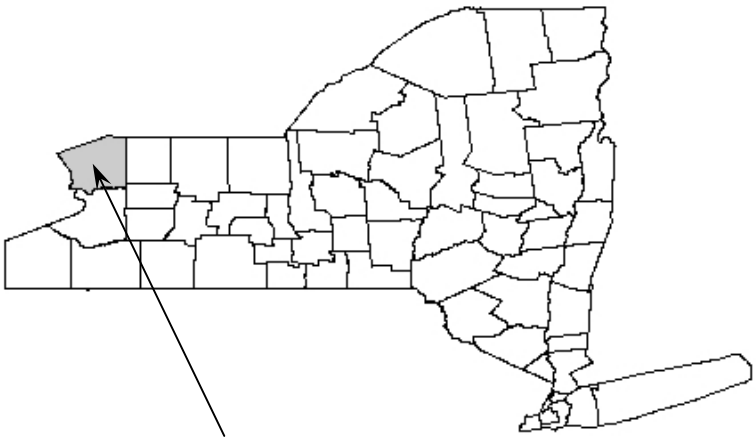
# FLOOD INSURANCE STUDY

VOLUME 1 OF 3

# NIAGARA COUNTY, NEW YORK

(ALL JURISDICTIONS)

| Community Name | Community Number |
|---|---|
| BARKER, VILLAGE OF | 360498 |
| CAMBRIA, TOWN OF | 360499 |
| HARTLAND, TOWN OF | 360500 |
| LEWISTON, TOWN OF | 360502 |
| LOCKPORT, CITY OF | 360503 |
| LOCKPORT, TOWN OF | 361013 |
| MIDDLEPORT, VILLAGE OF | 360505 |
| NEWFANE, TOWN OF | 360504 |
| NIAGARA FALLS, CITY OF | 360506 |
| NIAGARA, TOWN OF | 360507 |
| NORTH TONAWANDA, CITY OF | 360508 |
| PENDLETON, TOWN OF | 360509 |
| PORTER, TOWN OF | 360510 |
| ROYALTON, TOWN OF | 360511 |
| SOMERSET, TOWN OF | 360512 |
| WHEATFIELD, TOWN OF | 360513 |
| WILSON, TOWN OF | 360514 |
| WILSON, VILLAGE OF | 360978 |
| YOUNGSTOWN, VILLAGE OF | 360515 |



Niagara County

PRELIMINARY:
May 9, 2016

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
36063CV001B

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) report may not contain all data available within the Community Map Repository. It is advisable to contact the Community Map Repository for any additional data.

Part or all of this Flood Insurance Study may be revised and republished at any time. In addition, part of this Flood Insurance Study may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the Flood Insurance Study. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current Flood Insurance Study components.

Initial Countywide FIS Effective Date: September 17, 2010

Revised Countywide Date: To Be Determined

TABLE OF CONTENTS – Volume 1

TABLE OF CONTENTS – Volume 1
(Continued)

TABLE OF CONTENTS – Volume 2

EXHIBITS

TABLE OF CONTENTS – Volume 3

FLOOD INSURANCE STUDY
NIAGARA COUNTY, NEW YORK (ALL JURISDICTIONS)

# 1.0 INTRODUCTION

## 1.1 Purpose of Study

This countywide Flood Insurance Study (FIS) investigates the existence and severity of flood hazards in, or revises and updates previous FISs/Flood Insurance Rate Maps (FIRMs) for the geographic area of Niagara County, New York, including: the cities of Lockport, Niagara Falls and North Tonawanda; the towns of Cambria, Hartland, Lewiston, Lockport, Newfane, Niagara, Pendleton, Porter, Royalton, Somerset, Wheatfield and Wilson; and the villages of Barker, Middleport, Wilson and Youngstown (hereinafter referred to collectively as Niagara County).

This FIS aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This FIS has developed flood risk data for various areas of the county that will be used to establish actuarial flood insurance rates. This information will also be used by Niagara County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and will also be used by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

## 1.2 Authority and Acknowledgments

The sources of authority for this FIS are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

This FIS was prepared to include all communities within Niagara County in a countywide format. Information on the authority and acknowledgments for each jurisdiction included in this countywide FIS, as compiled from their previously printed FIS reports, is shown below.

| | |
|---|---|
| Barker, Village of | the hydrologic and hydraulic analyses for the FIS dated November 1, 1983 were prepared by Parsons, Brinckerhoff, Quade & Douglas, under subcontract to Goodkind & O'Dea, Inc. for the Federal Emergency Management Agency (FEMA) during the FIS for the Town of Somerset, New York. The work was completed in April 1976. |
| Cambria, Town of: | the hydrologic and hydraulic analyses for the FIS dated March 30, 1983 were prepared by De Leuw, Cather & Company of New York, Inc., for FEMA under Contract |

| | |
|---|---|
| | No. EMW-C-0060. The work was completed in November 1981. |
| Lewiston, Town of | the hydrologic and hydraulic analyses for the FIS dated December 1979 represent a revision of the original analyses performed by Goodkind & O'Dea, Inc. under Contract No. H-3831. The updated analyses were prepared by Parsons, Brinckerhoff, Quade & Douglas, under subcontract to Goodkind & O'Dea, Inc. The work was completed in December 1978. |
| Lockport, City of | the hydrologic and hydraulic analyses for the FIS dated August 4, 1980 were prepared by Parsons, Brinckerhoff, Quade & Douglas under subcontract Goodkind & O'Dea, Inc. for the Federal Insurance Administration (FIA) under Contract No. H-3831. The work was completed in May 1979. |
| Lockport, Town of | the hydrologic and hydraulic analyses for the FIS revised October 4, 2002, which included Eighteenmile Creek, Eighteenmile Creek East Tributary, Eighteenmile Creek West Tributary, Eighteenmile Creek East Branch, Gulf Branch and Gulf Tributary were prepared by Leonard Jackson Associates for FEMA under Contract No. 96-CO-0186. The work was completed in April 1999. The hydrologic and hydraulic analyses for Tonawanda Creek were prepared by Pratt & Huth for FEMA, in order to resolve a second appeal for the Town of Clarence, New York. The work was completed in August 1994. The hydrologic and hydraulic analyses for Donner Creek were prepared by Dewberry & Davis, LLC, and were based on a 1995 hydrologic analysis by the U.S. Army Corps of Engineers (USACE), Buffalo District. |
| Middleport, Village of | the hydrologic and hydraulic analyses for the FIS report dated February 1, 1983 were prepared by De Leuw, Cather & Company of New York, Inc., for FEMA under Contract No. EMW-C-0060. The work was completed in August 1981. |
| Newfane, Town of | the hydrologic and hydraulic analyses for the FIS report dated May 18, 1981 were prepared by Parsons, Brinckerhoff, Quade & Douglas under subcontract Goodkind & O'Dea, Inc. for the FIA under Contract No. H-3831. The work was completed in December 1976. |
| Niagara, Town of | the hydrologic and hydraulic analyses for the FIS report dated December 15, 1983 were prepared by URS McPhee, Smith, Rosenstein Engineers, P.C. for FEMA Contract No. H-4647. The work was completed in June 1982. |

| | |
|---|---|
| Niagara Falls, City of | the hydrologic and hydraulic analyses for the FIS revised September 5, 1990 were prepared by Dewberry & Davis, LLC, under agreement with FEMA. Technical data was provided by the USACE, Buffalo District. The work was completed in March 1989. |
| North Tonawanda, City of | the hydrologic and hydraulic analyses for the FIS report dated July 6, 1981 were prepared by De Leuw, Cather & Company of New York, Inc., for FEMA under Contract No. H-4552. The work was completed in March 1980. |
| Pendleton, Town of | the hydrologic and hydraulic analyses for the FIS report dated July 6, 1981 were prepared by Parsons, Brinckerhoff, Quade & Douglas under subcontract Goodkind & O'Dea, Inc. for the FIA under Contract No. H-3831. The work was completed in August 1977. |
| Porter, Town of | the hydrologic and hydraulic analyses for the FIS report dated February 15, 1983 were prepared by De Leuw, Cather & Company of New York, Inc., for FEMA under Contract No. EMW-C-0060. The work was completed in November 1981. |
| Somerset, Town of | the hydrologic and hydraulic analyses for the FIS report dated August 3, 1981 were prepared by Parsons, Brinckerhoff, Quade & Douglas under subcontract Goodkind & O'Dea, Inc. for FEMA under Contract No. H-3831. The work was completed in April 1976. |
| Wheatfield, Town of | the hydrologic and hydraulic analyses for the FIS report revised November 4, 1992 were prepared by the USACE, Buffalo District, for FEMA under Inter-Agency Agreement No. EMW-89-E-2994, Project Order No. 1. The work was completed in July 1990. The revised hydrologic and hydraulic analyses were performed by Wendel Design. The work was completed in July 1991. |
| Wilson, Town of | the hydrologic and hydraulic analyses for the FIS report dated October 1, 1980 represent a revision prepared by Parsons, Brinckerhoff, Quade & Douglas under subcontract Goodkind & O'Dea, Inc. for the FIA under Contract No. H-3831. The work was completed in February 1979. |
| Wilson, Village of | the hydrologic and hydraulic analyses for the FIS report dated May 1980 represent a revision prepared by Parsons, Brinckerhoff, Quade & Douglas under subcontract Goodkind & O'Dea, Inc. for the FIA under Contract No. H-3831. The work was completed in February 1979. |

| | |
|---|---|
| Youngstown, Village of | the hydrologic and hydraulic analyses for the FIS report dated December 1979 represent a revision prepared by Parsons, Brinckerhoff, Quade & Douglas under subcontract Goodkind & O'Dea, Inc. for the FIA under Contract No. H-3831. The work was completed in April 1979. |

The authority and acknowledgements for the towns of Hartland and Royalton are not available because no FIS reports were published for those communities.

**September 17, 2010**
**Initial Countywide FIS**

Revised hydrologic and hydraulic analyses for the streams shown in Table 3 were prepared for FEMA by Medina Consultants, P.C. under Contract No. EMN-2003-CO-0005. This work was completed in August 2008. Modifications to the hydrologic and hydraulic analyses for Bergholtz Creek were completed in August 2009.

Digital orthophotography of Niagara County was collected in Color Infrared, Natural Color and Panchromatic Color to obtain orthophotography for the entire county.

The 12-inch resolution Color Infrared Orthoimagery was collected for Niagara County New York at 10,000 AMT to produce 1 foot resolution Color Infrared digital orthophotos, tiled. Client provided DEM was used for orthophoto rectification. A minimum of two base stations were established in the project area. Image horizontal accuracy is +/-4 ft. at the 95% confidence level. Each file contains an image covering 3000 ft. by 2000 ft. on the ground.

The 12-inch resolution Natural Color Orthoimagery was collected for Niagara County New York at 10,000 AMT to produce 1 foot resolution Natural Color digital orthophotos, tiled. Client provided DEMs were used for orthophoto rectification. A minimum of two base stations were established in the project area. Image horizontal accuracy is +/-4 ft. at the 95% confidence level. Each file contains an image covering 3000 ft. by 2000 ft. on the ground.

The 24-inch resolution Panchromatic Orthoimagery contains 2005 digital orthoimagery of Niagara County, New York. Image pixel size is 2 ft. GSD. Image type is Panchromatic. Image horizontal accuracy is +/-8 ft. at the 95% confidence level. Each file contains an image covering 6000 ft. by 4000 ft. on the ground.

For isolated areas where the 2005 digital orthoimagery did not accurately depict the location of the studied water body, 12-inch resolution orthoimagery developed in 2008 was utilized. The image pixel size is 1.0' GSD. The image type is 4-band RGB and NIR. Image horizontal accuracy is +/- 4 ft. at the 95% confidence level. Each file contains an image covering 2000 ft. by 3000 ft. on the ground.

The coordinate system used for the production of the digital FIRM is Universal Transverse Mercator (UTM) Zone 18N. The horizontal datum as NAD 83, GRS 80 spheroid.

**TBD**
**Revised Countywide FIS**

For this revision, a new detailed hydraulic analysis was performed for Tonawanda Creek by CRA Infrastructure & Engineering, Inc. for the Town of Pendleton. The study was completed in August 2012. This study was incorporated by the Strategic Alliance for Risk Reduction II (STARR II) for FEMA under Contract No. HSFE60-15-D-0005, Task Order HSFE60-15-J-0002. This work was completed February 2016. The revisions performed by STARR II were based on the Floodplain Hydraulic Analysis Tonawanda Creek, Town of Pendleton, Niagara County, NY prepared by CRA Infrastructure and was initially submitted to FEMA as Letter of Map Revision (LOMR) Case Number 12-02-1567P. The result of this study also affects portions of Erie Canal, North Tonawanda Creek and Town Ditch No. 2.

1.3 Coordination

Consultation Coordination Officer's (CCO) meetings may be held for each jurisdiction in this countywide FIS. An initial CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to explain the nature and purpose of a FIS and to identify the streams to be studied by detailed methods. A final CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to review the results of the study.

The dates of the initial and final CCO meetings held for all jurisdictions within Niagara County and the incorporated communities within its boundaries are shown in Table 1, "Initial and Final CCO Meetings."

TABLE 1 – INITIAL AND FINAL CCO MEETINGS

| Community | Initial CCO Date | Final CCO Date |
|---|---|---|
| Barker, Village of | * | June 14, 1983 |
| Cambria, Town of | May 1979 | June 22, 1982 |
| Lewiston, Town of | November 4, 1976 | July 10, 1979 |
| Lockport, City of | * | March 3, 1980 |
| Lockport, Town of | May 24, 1977 | September 3, 1980 |
| | July 8, 1999[1] | August 3, 2000 |
| Middleport, Village of | * | April 7, 1982 |
| Newfane, Town of | September 25, 1975 | November 24, 1980 |
| Niagara Falls, City of | August 11, 1976 | May 12, 1982 |
| Niagara, Town of | * | April 14, 1983 |
| North Tonawanda, City of | May 23, 1977 | February 10, 1981 |
| Pendleton, Town of | * | January 28, 1981 |
| Porter, Town of | May 1979 | June 22, 1982 |
| Somerset, Town of | September 25, 1975 | January 27, 1981 |
| Wheatfield, Town of | September 25, 1975 | August 25, 1980 |
| Wilson, Town of | * | January 6, 1977 |
| Wilson, Village of | * | * |
| Youngstown, Village of | May 12, 1977 | July 10, 1979 |

* Data not available.
[1] Notified by letter.

**September 17, 2010**
**Initial Countywide FIS**

Initial CCO meetings were held December 3 and 4, 2008. These meetings were attended by representatives from FEMA, New York State Department of Environmental Conservation (NYSDEC), Medina Consultants, Dewberry, Niagara County and the jurisdictions within Niagara County.

**TBD**
**Revised Countywide FIS**

The results of the PMR were reviewed at the final CCO meeting held on _____ in _____, New York and was attended by representatives of _____. All problems raised at that meeting have been addressed in this study.

## 2.0 AREA STUDIED

### 2.1 Scope of Study

This FIS covers the geographic area of Niagara County, New York.

All or portions of the flooding sources listed in Table 2, "Flooding Sources Studied by Detailed Methods," were studied by detailed methods. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

TABLE 2 – FLOODING SOURCES STUDIED BY DETAILED METHODS

| | |
|---|---|
| Beaver Creek | Gulf Branch |
| Beaver Creek Tributary 1 | Gulf Tributary |
| Bergholtz Creek | Hopkins Creek |
| Bergholtz Creek Tributary BE-1 | Johnson Creek 2 |
| Brent Road Tributary | Johnson Creek 2 Tributary 1 |
| Bull Creek | Keg Creek |
| Bull Creek Tributary | Lake Ontario |
| Cayuga Creek | Mud Creek |
| Cayuga Creek Tributary | Niagara River – Tonawanda Channel |
| Cayuga Creek West Tributary | North Tonawanda Creek |
| Cayuga Creek West Tributary Diversion | Raymond Road Tributary |
| Donner Creek | Sawyer Creek East |
| Eighteenmile Creek | Sawyer Creek West |
| Eighteenmile Creek, East Branch | Tonawanda Creek |
| Eighteenmile Creek, East Tributary | Town Ditch No. 2 |
| Eighteenmile Creek, West Tributary | Tuscarora Bay |
| Erie Canal | Twelvemile Creek |
| Fish Creek 1 | Twelvemile Creek, East Branch |
| Fish Creek 2 | Twelvemile Creek, East Branch Tributary East |
| Gill Creek | Twelvemile Creek, East Branch Tributary South |
| Gill Creek East Tributary | Twelvemile Creek Tributary 3 |
| Golden Hill Creek | Twelvemile Creek Tributary 3A |

For this countywide FIS, seven streams throughout Niagara County have been restudied using detailed methods. The streams and the limits of detailed study are shown in Table 3 – "Scope of Revision for September 17, 2010, Countywide FIS."

TABLE 3 – SCOPE OF REVISION FOR SEPTEMBER 17, 2010, COUNTYWIDE FIS

| Stream Name | Limits of Detailed Study |
|---|---|
| Bergholtz Creek | 11.7 miles; from its confluence at Cayuga Creek to a point approximately 1.4 miles upstream of Route 425/Shawnee Road; in the City of Niagara Falls and towns of Cambria and Wheatfield. |
| Bull Creek | 9.5 miles; from confluence at Tonawanda Creek to approximately 500' upstream of Lockport Road; in the City of North Tonawanda and towns of Cambria, Pendleton and Wheatfield. |
| Cayuga Creek | 2.6 miles; from a point approximately 170' upstream of Niagara Falls Boulevard to a point approximately 1.4 miles upstream of Porter Road; in the City of Niagara Falls, Town of Niagara and Town of Wheatfield. |
| Cayuga Creek West Tributary & Cayuga Creek West Tributary Diversion | 3.4 miles; from its confluence with Cayuga Creek to a point approximately 250' upstream of Lockport Road; in the Town of Niagara. |
| Donner Creek | 1.3 miles; from Beattie Avenue to a point approximately 1,000' upstream of Lincoln Avenue; in the City of Lockport and Town of Lockport |
| Lake Ontario | Entire shoreline within Niagara County |
| Tonawanda Creek | Entire reach within the towns of Pendleton and Wheatfield |
| Sawyer Creek (East and West) | 6.0 miles; from its confluence at Bull Creek to the confluence of Bergholtz Creek; in the City of North Tonawanda and Town of Wheatfield. |
| Tuscarora Bay | Entire shoreline within Niagara County |
| Town Ditch No. 2 | 2.7 miles; from its confluence at Tonawanda Creek to a point approximately 4,066' upstream of Campbell Boulevard; in the Town of Pendleton. |

Table 4, "Stream Name Changes," lists streams that have names in this countywide FIS other than those used in previously printed FISs for the communities in which they are located.

TABLE 4 – STREAM NAME CHANGES

| Community | Old Name | New Name |
|---|---|---|
| Porter, Town of | Tributary B-1 | Beaver Creek Tributary 1 |
| Niagara, Town of | West Tributary to Cayuga Creek | Cayuga Creek West Tributary |
| Lockport, Town of<br>Newfane, Town of | East Branch Eighteenmile Creek | Eighteenmile Creek East Branch |
| Lockport, Town of | East Tributary Eighteenmile Creek | Eighteenmile Creek East Tributary |
| Lockport, Town of | West Tributary Eighteenmile Creek | Eighteen Mile Creek West Tributary |
| Lewiston, Town of | Fish Creek | Fish Creek 1 |
| Somerset, Town of | Fish Creek | Fish Creek 2 |
| Niagara, Town of | East Tributary to Gill Creek | Gill Creek East Tributary |
| Middleport, Village of | Johnson Creek | Johnson Creek 2 |
| Middleport, Village of | Tributary J-1 | Johnson Creek 2 Tributary 1 |
| Cambria, Town of<br>Wilson, Town of<br>Wilson, Village of | East Branch Twelvemile Creek | Twelvemile Creek East Branch |
| Wilson, Town of | Tributary East of East Branch Twelvemile Creek | Twelvemile Creek East Branch East Tributary |
| Wilson, Town of | Tributary South of East Branch Twelvemile Creek | Twelvemile Creek East Branch South Tributary |
| Porter, Town of | Tributary T-3 | Twelvemile Creek Tributary 3 |
| Porter, Town of | Tributary T-3A | Twelvemile Creek Tributary 3A |

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

Numerous flooding sources in the country were studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and Niagara County.

This FIS also incorporates the determinations of letters issued by FEMA resulting in map changes (Letter of Map Revision [LOMR], Letter of Map Revision - based on Fill [LOMR-F], and Letter of Map Amendment [LOMA], as shown in Table 5, "Letters of Map Change."

TABLE 5 – LETTERS OF MAP CHANGE

| Community | Flooding Source(s) Project Identifier | Date Issued | Type |
|---|---|---|---|
| Cambria, Town of | Cambria-Wilson Road - Tributary T-5A | February 26, 1996 | LOMR |
| Cambria, Town of | Bergholtz Creek Tributary BE-1 | January 24, 2008 | LOMR |
| Newfane, Town of | Eighteenmile Creek East Branch | June 16, 2004 | LOMR |
| Niagara Falls, City of | Gill Creek Flood Zone Study | June 16, 2004 | LOMR |

**TBD**
**Revised Countywide FIS**

In September 2015, STARR II was contracted by FEMA to incorporate LOMR 12-02-1567P as a Physical Map Revision (PMR) for the Town of Pendleton. The stream reaches affected are: Erie Canal, from the confluence with Tonawanda Creek to approximately 5,890 feet upstream of the confluence, North Tonawanda Creek, from the confluence with the Erie Canal to just downstream of East Canal Road, Tonawanda Creek, from approximately 4,250 feet downstream of Bear Ridge Road to approximately 2,910 feet upstream of New Road, and Town Ditch No. 2, from the confluence with Tonawanda Creek to approximately 4,100 feet upstream of Campbell Boulevard.

## 2.2 Community Description

Niagara County is located in the extreme western part of New York State, adjacent to Lake Ontario to the north, the Niagara River and Canada to the west, Orleans County to the east, Genesee County to the southeast, and Erie County to the south. Niagara County spans 1,140 square miles and according to the 2010 census, the population was 216,469. The County seat is the City of Lockport. Several major highways span Niagara County, including Interstate 190, US Route 62, State Routes 18, 31 and 78, and the Robert Moses State Parkway. Niagara County is also home to the Tuscarora Indian Reservation and the Tonawanda Indian Reservation.

Niagara County is home to the Niagara Falls, which in effect serves as a drainage ditch for four of the Great Lakes and borders both Niagara County and Canada. Water passing over Niagara Falls originates from Lake Erie and flows down the Niagara River before passing over Niagara Falls. Large electrical power plants are fed by Niagara Falls on both the American and Canadian sides.

Niagara County has a temperate climate with warm summers and cold winters. The average daily high temperature is 57 degrees and the average daily low temperature is 38 degrees. The average annual rainfall is approximately 36 inches and the average annual snowfall is approximately 82 inches.

## 2.3 Principal Flood Problems

Flooding in Niagara County is attributed mainly to heavy rains resulting from localized thunderstorms, hurricanes and, along its shoreline, high water levels in Lake Ontario combined with high winds.

In the Village of Barker, flooding problems are caused by the overflow of Golden Hill Creek. Prolonged spring thaws and heavy summer rainfall create the most severe flooding conditions.

In the Town of Lewiston, inadequate drainage systems and heavy land development compound the problem of flooding during heavy rain storms.

In the City of Lockport, low-lying areas are subject to flooding caused by the overflow of Eighteenmile Creek, Gulf Branch and Lincoln Avenue Branch. Heavy rains in conjunction with snowmelt and ice jams in the early spring cause the most severe flooding.

In the Town of Lockport, floods in Tonawanda Creek are caused by snowmelt coupled with rainfall in the late winter and early spring. The floods from Tonawanda Creek generally overflow and cause floods in the Mud Creek Watershed.

In the Village of Middleport, flooding primarily occurs along Johnson Creek 2 Tributary 1, where an underground culvert system was inadequately designed and holds capacity less than the 10-percent annual chance discharge. Debris collects at the trash rack of the opening to the system and obstructs flow to further add to overland flooding.

In the Town of Newfane, flooding is confined to low-lying areas adjacent to Lake Ontario on the east and west sides of Eighteenmile Creek. This usually occurs when heavy rains and high winds cause Lake Ontario's water levels to rise. However, some local floods along the channel may be attributed to ice jams.

In the City of Niagara Falls, low-lying areas are subject to flooding caused by overflow of Cayuga Creek, Bergholtz Creek and Gill Creek. Prolonged spring thaws and heavy summer rainfall create the most severe flooding conditions. Shallow flooding caused by ponding of runoff during heavy rains also occurs in several low-lying areas in the eastern portion of the City. In the past, flooding of Cayuga Island had been caused by the backwater effect created by ice jams in the Niagara River above the Falls, and longduration storms over Lake Erie.

In the City of North Tonawanda, flooding problems on the Niagara River – Tonawanda Channel have been associated with high-water elevations and ice jams. Strong winds blowing across Lake Erie from the southwest cause a wind setup of the lake and high elevations on the river. Large ice jams occur on the river in the spring when the ice breaks up on the lake and flows down the river. Tonawanda Creek and Bull Creek have been relatively free of overbank flooding.

In the Town of Pendleton, flooding generally occurs along Tonawanda Creek, North Tonawanda Creek, Mud Creek, Branch Mud Creek, Bull Creek and Bull Creek Tributary. Flooding is generally a result of heavy rainfall and rapid thaws.

In the Town of Porter, flooding primarily occurs along the Niagara River during the spring thaw resulting from ice jams on the river. Other flooding in the area can be attributed to undersized or clogged culverts.

In the Town of Somerset, flooding has occurred at Golden Hill Creek and Fish Creek 2. Flatlands and farm pastures adjacent to the streams are subject to periodic flooding, usually a result of prolonged spring thaws and heavy summer rainfalls. Additionally, along Lake Ontario, high lake levels and prolonged easterly and northerly winds have resulted in considerable shoreline erosion and loss of private property.

In the Town of Wheatfield, flooding may occur during peak storm flows in areas adjacent to streams due to inadequate grades, low stream banks, undersized culverts, and debris and sediment deposits.

In the Town of Wilson, flooding due to heavy rains and high winds and water levels along Lake Ontario can occur. Flooding usually occurs in mostly undeveloped, low-lying areas of the town. Erosion along the lake shore occurs due to wave action and high water levels, caused by heavy rains and high winds.

In the Village of Wilson, flooding occurs along the shoreline of Lake Ontario and inland along the banks of Twelvemile Creek, East Branch.

In the Village of Youngstown, flooding primarily exists along the lower level of the bank of the Niagara River, usually due to ice jams. Because of limited differences in elevations between different parts of the community, stormwater runoff causes ponding, and local drainage facilities are inadequate.

Several severe storms have struck Niagara County in the past. The most severe of these storms are described below.

In February 1985, severe storms and flooding struck Niagara County. At USGS Gage No. 04218000 on Tonawanda Creek at Rapids, a peak streamflow of 8,500 cfs was recorded, and corresponded to a gage height of 15.88 feet (USGS, Ret. May 2008). This was the highest recording at that gage since 1960 and no higher stages have been recorded since. According to the National Weather Service (NWS), a flood at or above 16 feet would correspond to widespread flooding through most of North Clarence (Erie County), North Amherst (Erie County), Royalton, Newstead (Erie County) and cause significant road closures. Backwater flooding would also occur on Ransom Creek, Black Creek, Mud Creek and Beeman Creek (USGS, Ret. May 2008). The area was declared a federal disaster in March 1985.

In January 1998, severe winter snow and ice storms struck Niagara County. At USGS Gage No. 04218000 on Tonawanda Creek, a peak streamflow of 6,600 cfs was recorded, and corresponded to a gage height of 14.83 feet (USGS, Ret. May 2008). According to 11 the NWS, a flood between 14 and 16 feet would correspond to moderate flooding and result in road closures in Royalton and Newstead. Some subdivisions in the Ransom Oaks area would experience flooding from backwater into smaller creeks (USGS, Ret. May 2008). The area was declared a federal disaster on January 21, 1998.

Other storms of significance occurred in January 1996, March 2003, April 2005 and March 2007 (USGS, Ret. May 2008).

## 2.4 Flood Protection Measures

In the Town of Cambria, flood protection measures are limited to clearing debris and ditching along Bergholtz Creek and Twelvemile Creek, East Branch.

In the Town of Lewiston, a 1973 drainage control law was enacted by the Town, as well as restrictions on new construction within the flood hazard area.

In the City of Lockport, a task force was assembled to periodically clean the inlet of the 72-inch culvert located at Lincoln Avenue, an area prone to flooding.

In the Town of Lockport, flood protection measures are limited to clearing and dredging troublesome portions of Donner Creek and Mud Creek. Additionally, town building permit systems regulate new development within the floodplains of the Town.

In the Village of Middleport, flood protection measures are limited to the clearing of troublesome portions of Johnson Creek 2 and Johnson Creek 2 Tributary 1, as needed.

In the Town of Newfane, after the storm of March 1973, the USACE assisted the Town by providing parallel seawalls constructed of riprap and stone gabions. The seawalls are located at the mouth of Eighteenmile Creek to prevent low-lying areas of Olcott from future flooding. These measures were effective during the April 1976 storm. Additionally, the Town has a Flood Control Ordinance which controls development within the flood hazard areas.

In the Town of Niagara, flood protection measures are limited to some minor artificial embankments which have been constructed on a portion of Cayuga Creek.

In the Town of Pendleton, maintenance of Tonawanda Creek is the responsibility of the State of New York, because Tonawanda Creek forms an integral part of the New York State Barge Canal system.

In the Town of Porter and Village of Youngstown, in an effort to reduce the ice jamming on the Niagara River, an ice boom is placed across the inlet of the river in the City of Buffalo, at the mouth of Lake Erie. The boom is removed in the spring, after five consecutive 35-degree days and when Lake Erie contains less than 600 square miles of ice. Additionally, troublesome portions of the Niagara River and other studies streams are cleared and ditched to redirect flow as needed.

In the Town of Somerset, concrete walls and riprap have been installed along the shoreline of Lake Ontario. Additionally, outflow from Lake Ontario is regulated by a powerhouse and dam at Barnhart Island, New York and is controlled following a written plan and procedure.

In the Town of Wheatfield, flood protection measures are limited to the annual cleaning and maintenance of existing ditches.

## 3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this FIS. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent annual chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1-percent annual chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the county at the time of completion of this FIS. Maps and flood elevations will be amended periodically to reflect future changes.

### 3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the flooding sources studied in detail affecting the county.

**Precountywide Analyses**

Each jurisdiction within, Niagara County, with the exceptions of the towns of Hartland and Royalton has a previously printed FIS report. The hydrologic and hydraulic analyses described in those reports have been compiled and are summarized below.

Elevation-frequency relationships for Lake Ontario were obtained from a study conducted by the USACE in 1988 (USACE, 1988). This study was a revision on the original 1977 report (USACE, 1977). In the revised study, gage information from seven continuously reporting gage stations was used:

- Oswego (Gage No. 2030), with record since 1935;
- Rochester (Gage No. 2058), with record since 1956;
- Cape Vincent (Gage No. 2000), with record since 1916;
- Port Weller (Canadian Gage No. 02HA018), with record since 1930;
- Toronto (Canadian Gage No. 02HC048), with record since 1915;
- Cobourg (Canadian Gage No. 02HD015), with record since 1956;
- Kingston (Canadian Gage No. 02HM008), with record since 1956.

For the updated Lake Ontario study, both the log-Pearson Type III and Pearson Type III distributions were investigated. Comparison of the two methods resulted in nearly identical skew values, and logarithmic transformation was not needed, therefore a Pearson Type III frequency distribution was used. A skew value of 0.4 was utilized for Lake Ontario. Flood levels for open-coast Lake Ontario were computed for each station taking into consideration years of gage record, physical environment and shoreline configuration. In the USACE study, stillwater elevations for Lake Ontario were divided into five regions, 14 Region A, Region B, Region C, Region D and Region E. The shoreline within Niagara County corresponded to Region E. Elevations for the selected recurrence intervals of Lake Ontario were utilized for Tuscarora Bay as well.

Elevation-frequency relationships for Niagara River – Tonawanda Channel were derived using information supplied by the USACE (Bill Endell) and Ontario-Hydro (Ontario-Hydro, Unpublished). Stage elevations for the following gages were utilized: Black Rock Gage (Squaw Island in the City of Buffalo), Huntley Station Gage (in the Town of Buffalo), Tonawanda Island Gage (Tonawanda Island in the City of North Tonawanda) and the Lasalle Gage (in the City of Niagara Falls). For the maximum annual instantaneous peaks, statistical analyses were made for these gages using a non-log Pearson Type III distribution. Using a skew of 0.0 and the standard deviation computed for each gage, stage elevations were computed for the selected recurrence intervals. Profiles for the Niagara River – Tonawanda Channel were established by connecting the respective stage elevations at the various gages. A summary of stillwater elevations is shown in Table 6 – "Summary of Stillwater Elevations."

TABLE 6 – SUMMARY OF STILLWATER ELEVATIONS

| FLOODING SOURCE AND LOCATION | STILLWATER ELEVATION (feet NAVD) 10-PERCENT | 2-PERCENT | 1-PERCENT | 0.2-PERCENT |
|---|---|---|---|---|
| LAKE ONTARIO | | | | |
| Entire Niagara County shoreline from confluence of Niagara River to eastern Niagara County corporate limits | 247.7 | 248.5 | 248.7 | 249.4 |
| NIAGARA RIVER – TONAWANDA CHANNEL | | | | |
| At corporate limits of City of North Tonawanda – 42,900' above Niagara Falls | 568.1 | 568.7 | 568.9 | 569.4 |
| At confluence of Tonawanda Creek – 57,900' above Niagara Falls | 569.2 | 569.8 | 570.0 | 570.6 |
| TUSCARORA BAY | | | | |
| Entire shoreline within the Town of Wilson and Village of Wilson | 247.7 | 248.5 | 248.7 | 249.4 |

For streams studies by detailed methods in Niagara County, several methods were used for hydrologic analyses. For Eighteenmile Creek and Eighteenmile Creek, East Branch, a log-Pearson Type III analysis was performed based on the USGS gaging stations mentioned above, and then for comparison an analysis was conducted using the Bureau of Public Roads (BPR) Circular No. 4 (U.S. Department of Commerce, 1963). The results checked closely with each other, and the peak discharges from the log-Pearson Type III analysis were used.

For Gill Creek, peak discharge-frequency relationships were determined using the BPR Circular No. 4. Parameters such as drainage area, length and slope of stream, and precipitation were used to develop the peak rates of runoff along the stream.

For Golden Hill Creek, Twelvemile Creek and Twelvemile Creek, East Branch, the hydrologic analysis was performed by first determining the peak discharge-frequency relationships of nine USGS gaging stations on Cattaraugus Creek, Eighteenmile Creek, Smoke Creek, Buffalo Creek, Little Buffalo Creek, Cayuga Creek, Cazenovia Creek and Scajaquada Creek. Drainage area-discharge relationships were established using the standard log-Pearson Type III method as outlined by the Water Resources Council (Water Resources Council, 1976), without the influence of expected probability adjustments. The regional skew value of 0.0 was a computed weighted average considering the natural skews and years of record for each gage. Regional curves were then determined which graphically correlated peak discharge and drainage information, and that data was extended to cover all local watersheds with drainage areas less than 15 square miles. Methods outlined in BPR Circular No. 4 were also used and compared with the regional curves, and were found to closely match each other.

In the Town of Lewiston, peak discharges for Fish Creek 1were determined using the same regional curve methodology described above.

In the City of Lockport, peak discharges for Gulf Branch and Lincoln Avenue Branch were determined using the same regional curve methodology described above.

In the Town of Lockport, peak discharges for Donner Creek were determined using the same regional curve methodology described above. Peak discharges for Mud Creek were obtained from the USACE report on floodplain management in the Tonawanda Creek watershed (USACE, 1976), which also used a standard log-Pearson Type III analysis on gage information on hydrologically similar drainage basins within the watershed. For comparison, peak discharges for Mud Creek were also calculated using the Interim Report and were found to be larger than the USACE study discharges for all events except the 0.2-percent annual chance flood. Discharges for Tonawanda Creek within the Town of Lockport were calculated using HEC-1 computer modeling and a regional frequency analysis developed by the Buffalo District USACE for a Buffalo River/Lower Tonawanda Creek Study (USACE, 1978; USACE, 1990). The Rational Method (Q=CIA) was used to determine peak discharges for Eighteenmile Creek, East Tributary and Gulf Tributary.

In the Village of Middleport, hydrologic information for Johnson Creek 2 and Johnson Creek 2 Tributary 1 were obtained from an adaptation of regional flood-frequency curves previously determined (Goodkind and O'Dea, 1978) for other FISs in Niagara and Erie Counties, and the regional curve methodology described above.

In the Town of Newfane, peak discharges for Keg Creek and Hopkins Creek were determined using the regional curve methodology above.

In the Town of Niagara, peak discharges for Gill Creek, East Tributary were determined using the BPR Circular No. 4.

In the City of Niagara Falls, hydrologic analysis for the Niagara River – Tonawanda Channel was prepared by the Buffalo District USACE and consisted of deriving stage-frequency relationships for the gages along the channel and connecting the respective elevations at each gage to create flood profiles.

In the Town of Pendleton, peak discharges for North Tonawanda Creek, Mud Creek and Bull Creek Tributary were determined using the regional curve methodology described above.

In the Town of Porter, peak discharges for Beaver Creek, Beaver Creek Tributary B1, Twelvemile Creek Tributary 3 and Twelvemile Creek Tributary 3A were determined using the regional curve methodology described above.

In the Town of Somerset, peak discharges for Fish Creek 2 were determined using the same regional curve methodology described above.

In the Town of Wheatfield, peak discharges for Cayuga Creek, Cayuga Creek Tributary, Brent Road Tributary, and Raymond Road Tributary were determined using the same regional curve methodology described above. Flood profiles previously determined for the Niagara River – Tonawanda Channel were revised to reflect the more recent high water marks taken from the Flood Damage Study, Tonawanda Channel, Upper Niagara River, New York study (USACE, 1986).

In the Town of Wilson, peak discharges for Twelvemile Creek, East Branch Tributary East and Twelvemile Creek, East Branch Tributary South were determined using the same regional curve methodology above.

**September 17, 2010**
**Initial Countywide FIS**

Information on the methods used to determine peak discharge-frequency relationships for the streams shown in Table 3, restudied as part of this countywide FIS is shown below.

Due to the lack of USGS gaging stations within the streams studied by detailed methods, two sets of regional regression equations were evaluated for the best peak flow estimate of the 10-, 2-, 1- and 0.2-percent annual chance event. These were taken from two USGS published reports, WRI 90-4197 (USGS, 1991) and SIR 2006-5112 (USGS, 2006).

The National Flood Frequency (NFF) program (USGS, 2002) was used to calculated discharges for WRI 90-4197. The variables governing the discharges for each of the flow locations are drainage area (A), basin storage (ST), main channel slope (S) and mean annual precipitation (P). These variables were determined based on USGS 7.5-Minute Quadrangles. The P was calculated based on distribution of mean annual precipitation in New York.

The New York Flood Frequency Tool (NYFFT) (USGS, 2006) was used to calculate discharges for SIR 2006-5112. The variables governing the discharges for each of the flow locations are drainage area (A), basin storage (ST), mean annual runoff (RUNF) and slope ratio (SR). These variables were determined internally by the program with the exception of drainage area, which was determined using USGS 7.5-Minute Quadrangles.

For Sawyer Creek, the basin is split into two flow directions (East and West). Ward Road is the diving point. Sawyer Creek East flows into Bull Creek and West into Bergholtz Creek.

It was determined that the peak discharges calculated using the regression equations outlined in WRI 90-4197 resulted in the best estimate for Niagara County, based on

comparisons of published peak flow occurrences, previous FISs and neighboring gage location with similar basin characteristics. For Donner Creek, an urban variable was added to reflect the significant development with in the basin. This was performed by employing the nationwide urban equations as established in USGS WSP 2207 (USGS, 1983).

For Tonawanda Creek in this revision, hydrologic analysis was taken from the FIS for the Town of Amherst in Erie County, New York (FEMA, October 1992). Hydrologic data was developed for four portions on the creek. The peak discharges were calculated using a regional frequency analysis and runoff models using HEC-1 which were developed by the USACE, Buffalo District.

A summary of the drainage area-peak discharge relationships for all streams studied by detailed methods is shown in Table 7, "Summary of Discharges."

TABLE 7 – SUMMARY OF DISCHARGES

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (sq. miles) | PEAK DISCHARGES (cfs) 10-PERCENT | 2-PERCENT | 1-PERCENT | 0.2-PERCENT |
|---|---|---|---|---|---|
| BERGHOLTZ CREEK | | | | | |
| At mouth | 17.29 | 711 | 989 | 1,110 | 1,390 |
| Downstream of confluence of Sawyer Creek | 13.66 | 691 | 965 | 1,080 | 1,360 |
| Upstream of confluence of Sawyer Creek | 12.12 | 620 | 867 | 975 | 1,220 |
| At Niagara Road | 9.45 | 528 | 743 | 837 | 1,050 |
| At Raymond Road | 4.52 | 279 | 394 | 444 | 555 |
| At Human Road | 3.24 | 238 | 342 | 386 | 487 |
| BERGHOLTZ CREEK TRIBUTARY BE-1 | | | | | |
| At Conrail Crossing | * | * | * | 300 | * |
| BRENT ROAD TRIBUTARY | | | | | |
| At mouth | 1.70 | 265 | 405 | 470 | 650 |
| BULL CREEK | | | | | |
| At mouth | 28.48 | 1,050 | 1,430 | 1,590 | 1,960 |
| Upstream of confluence with Sawyer Creek | 21.26 | 815 | 1,110 | 1,240 | 1,530 |
| At Loveland Road | 14.10 | 574 | 785 | 877 | 1,080 |
| Downstream of confluence of Bull Creek Tributary | 9.85 | 465 | 614 | 717 | 889 |
| At upstream limit of detailed study | 4.48 | 258 | 356 | 399 | 498 |

* Data not available

TABLE 7 – SUMMARY OF DISCHARGES
(Continued)

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (sq. miles) | PEAK DISCHARGES (cfs) 10-PERCENT | 2-PERCENT | 1-PERCENT | 0.2-PERCENT |
|---|---|---|---|---|---|
| BULL CREEK TRIBUTARY | | | | | |
| At confluence with Bull Creek | 2.02 | 105 | 156 | 178 | 234 |
| At upstream corporate limits, Town of Pendleton | 0.87 | 50 | 76 | 88 | 118 |
| CAYUGA CREEK | | | | | |
| At confluence with Little Niagara River | 28.2 | 1,650 | 2,650 | 3,050 | 3,800 |
| At upstream corporate limits, City of Niagara Falls | 14.3 | 950 | 1,450 | 1,650 | 2,100 |
| Upstream of confluence of Bergholtz Creek | 14.02 | 642 | 894 | 1,000 | 1,250 |
| Downstream of confluence of Western Tributary | 12.74 | 584 | 814 | 914 | 1,130 |
| CAYUGA CREEK TRIBUTARY | | | | | |
| At mouth | 1.85 | 290 | 420 | 490 | 680 |
| CAYUGA CREEK WEST TRIBUTARY | | | | | |
| At mouth | 1.81 | 173 | 253 | 287 | 366 |
| At Packard Road | 0.39 | 49.9 | 73.4 | 83.4 | 107 |
| DONNER CREEK | | | | | |
| At South Transit Road | 2.77 | 420 | 620 | 880 | 950 |
| At Beattie Road | 2.16 | 334 | 446 | 526 | 631 |
| At Lincoln Road | 0.72 | 190 | 267 | 300 | 362 |
| EIGHTEENMILE CREEK | | | | | |
| At confluence with Lake Ontario | 82.5 | 7,250 | 10,200 | 11,800 | 15,100 |
| At downstream corporate limits, Town of Lockport | 21.90 | 1,850 | 2,650 | 3,100 | 4,000 |
| Downstream of confluence with West Tributary | 21.30 | 1,821 | 2,608 | 3,049 | 3,937 |
| At upstream corporate limits, Town of Newfane | 16.50 | 1,850 | 2,650 | 3,100 | 4,000 |
| Just upstream of confluence with small tributary | 10.60 | 1,228 | 1,740 | 2,009 | 2,632 |
| At downstream corporate limits, City of Lockport | 10.00 | 1,200 | 1,700 | 1,960 | 2,570 |
| At upstream corporate limits, City of Lockport | 2.20 | 330 | 490 | 545 | 770 |

* Data not available

TABLE 7 – SUMMARY OF DISCHARGES
(Continued)

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (sq. miles) | PEAK DISCHARGES (cfs) 10-PERCENT | 2-PERCENT | 1-PERCENT | 0.2-PERCENT |
|---|---|---|---|---|---|
| EIGHTEENMILE CREEK EAST BRANCH | | | | | |
| At confluence with Eighteenmile Creek | 43.00 | 4,150 | 5,950 | 6,750 | 8,800 |
| At Lake Avenue | 40.90 | 3,931 | 5,639 | 6,393 | 8,340 |
| At Wicks Road | 39.40 | 3,813 | 5,471 | 6,200 | 8,091 |
| At upstream corporate limits, Town of Newfane | 39.40 | 3,813 | 5,471 | 6,200 | 8,091 |
| EIGHTEENMILE CREEK EAST TRIBUTARY | | | | | |
| At downstream corporate limits, Town of Lockport | 1.10 | 289 | 366 | 405 | 493 |
| At confluence of small tributary | 0.60 | 167 | 215 | 238 | 265 |
| EIGHTEENMILE CREEK WEST TRIBUTARY | | | | | |
| At confluence with Eighteenmile Creek | 10.10 | 1,061 | 1,587 | 1,821 | 2,376 |
| Just upstream of confluence of small tributary | 8.80 | 989 | 1,488 | 1,709 | 2,236 |
| Just upstream of confluence of small tributary | 6.60 | 790 | 1,192 | 1,370 | 1,795 |
| ERIE CANAL | | | | | |
| At the confluence with Tonawanda Creek | 1.51 | 440 | 620 | 760 | 880 |
| FISH CREEK 1 | | | | | |
| At mouth | 4.69 | 650 | 960 | 1,050 | 1,470 |
| At confluence of Tributary A | 3.87 | 560 | 820 | 910 | 1,260 |
| At upstream limit of detailed study | 3.21 | 470 | 700 | 770 | 1,080 |
| FISH CREEK 2 | | | | | |
| At mouth | 13.42 | 1,590 | 2,300 | 2,600 | 3,480 |
| GILL CREEK | | | | | |
| At confluence with Niagara River | 12.10 | 620 | 1,190 | 1,490 | 2,660 |
| At Ferry Avenue | 10.50 | 530 | 1,060 | 1,530 | 2,620 |
| At Hyde Park Dam | 9.30 | 480 | 960 | 1,350 | 2,330 |
| Downstream of confluence of East Gill Creek | 8.30 | 450 | 880 | 1,210 | 2,100 |
| At Niagara Town – Niagara Falls City corporate boundary | 5.00 | 260 | 540 | 730 | 1,250 |

TABLE 7 – SUMMARY OF DISCHARGES
(Continued)

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (sq. miles) | PEAK DISCHARGES (cfs) 10-PERCENT | 2-PERCENT | 1-PERCENT | 0.2-PERCENT |
|---|---|---|---|---|---|
| GILL CREEK (Continued) | | | | | |
| At upstream corporate limit of the Town of Niagara | 3.80 | 350 | 510 | 590 | 760 |
| At confluence of reservoir stream | 3.58 | 520 | 760 | 850 | 1,180 |
| At upstream limit of detailed study | 2.24 | 350 | 520 | 570 | 800 |
| GILL CREEK EAST TRIBUTARY | | | | | |
| Upstream of Interstate 190 | 1.30 | 230 | 350 | 390 | 480 |
| Downstream of Lockport Road | 0.70 | 170 | 270 | 330 | 460 |
| GOLDEN HILL CREEK | | | | | |
| At mouth | 21.80 | 2,380 | 3,400 | 3,800 | 5,100 |
| At Hosmer Road | 6.50 | 820 | 1,220 | 1,350 | 1,850 |
| GULF BRANCH | | | | | |
| At Stone Road | 4.5 | 610 | 880 | 995 | 1,360 |
| At upstream corporate limits, City of Lockport | 3.5 | 495 | 720 | 810 | 1,130 |
| GULF TRIBUTARY | | | | | |
| At downstream corporate limits, Town of Lockport | 0.28 | 149 | 199 | 215 | 259 |
| HOPKINS CREEK | | | | | |
| At confluence with Lake Ontario | 15.20 | 1,780 | 2,500 | 2,870 | 3,800 |
| JOHNSON CREEK 2 | | | | | |
| At northern corporate limit, Village of Middleport | 12.30 | 1,130 | 1,560 | 1,670 | 1,700[2] |
| Downstream of confluence with Johnson Creek 2 Tributary 1 | 11.00 | 1,130 | 1,560 | 1,770 | 2,270 |
| At Francis Street | 8.90 | 950 | 1,300 | 1,480 | 1,900 |
| JOHNSON CREEK 2 TRIBUTARY 1 | | | | | |
| At Kelly Street | 2.10 | 240[1] | 330[1] | 360[1] | 500[1] |
| KEG CREEK | | | | | |
| At confluence with Lake Ontario | 13.50 | 1,570 | 2,280 | 2,560 | 3,450 |

[1] 20 cfs through underground culvert

[2] Restriction in flow due to underground culvert at New York State Barge Canal

TABLE 7 – SUMMARY OF DISCHARGES
(Continued)

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (sq. miles) | PEAK DISCHARGES (cfs) 10-PERCENT | 2-PERCENT | 1-PERCENT | 0.2-PERCENT |
|---|---|---|---|---|---|
| MUD CREEK | | | | | |
| At confluence with Tonawanda Creek | 41.10 | 1,900 | 2,400 | 2,700 | 3,100 |
| At upstream corporate limits, Town of Pendleton | 40.70 | 1,900 | 2,400 | 2,700 | 3,100 |
| At Rapids Road | 32.60 | 1,650 | 2,230 | 2,470 | 3,030 |
| NORTH TONAWANDA CREEK | | | | | |
| At confluence with Erie Canal | 0.79 | 300 | 420 | 530 | 1,875 |
| At confluence with Tonawanda Creek | 0.47 | 260 | 370 | 460 | 1,795 |
| RAYMOND ROAD TRIBUTARY | | | | | |
| At mouth | 1.67 | 260 | 390 | 450 | 640 |
| SAWYER CREEK EAST | | | | | |
| At confluence with Tonawanda Creek | 6.90 | 279 | 375 | 417 | 510 |
| At Nash Road | 3.21 | 136 | 183 | 204 | 247 |
| SAWYER CREEK WEST | | | | | |
| At confluence with Bergholtz Creek | 1.54 | 84.1 | 114 | 127 | 156 |
| TONAWANDA CREEK | | | | | |
| At Creekside Drive | 530.00 | 13,000 | 17,000 | 18,700 | 22,300 |
| At Twin Cities Memorial Highway | 525.00 | 11,700 | 15,900 | 17,150 | 22,000 |
| Downstream of confluence of Bull Creek | 520.00 | 11,600 | 15,800 | 17,000 | 21,800 |
| Upstream of confluence of Bull Creek | 504.00 | 12,400 | 16,200 | 17,800 | 21,390 |
| At upstream confluence of Ransom Creek | 435.00 | 9,400 | 10,900 | 11,500 | 13,300 |
| Upstream of confluence of Mud Creek | 379.00 | 5,600 | 6,500 | 6,600 | 7,000 |
| At downstream corporate limits, Town of Lockport | 351.00 | * | * | 6,600 | * |
| At most upstream crossing of Rapids Road | 331.00 | * | * | 8,950 | * |

* Data not available

TABLE 7 – SUMMARY OF DISCHARGES
(Continued)

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (sq. miles) | PEAK DISCHARGES (cfs) 10-PERCENT | 2-PERCENT | 1-PERCENT | 0.2-PERCENT |
|---|---|---|---|---|---|
| TOWN DITCH NO. 2 | | | | | |
| At mouth | 4.29 | 172 | 230 | 256 | 310 |
| At Main Road | 2.70 | 117 | 157 | 174 | 212 |
| TWELVEMILE CREEK | | | | | |
| At Lake Ontario | 36.00 | 3,425 | 4,925 | 5,500 | 7,250 |
| At Porter Town – Wilson Town corporate boundary | 25.50 | 2,715 | 3,925 | 4,375 | 5,850 |
| Downstream of confluence with Beaver Creek | 23.40 | 2,200 | 3,000 | 3,400 | 4,400 |
| Upstream of confluence with Beaver Creek | 14.60 | 1,480 | 20,000 | 2,300 | 2,900 |
| Approximately 600' upstream of State Route 93 | 13.10 | 1,320 | 1,800 | 2,040 | 2,670 |
| TWELVEMILE CREEK EAST BRANCH | | | | | |
| At Lake Ontario | 37.70 | 3,530 | 5,040 | 5,710 | 7,540 |
| At State Route 18 | 36.50 | 3,530 | 5,040 | 5,710 | 7,540 |
| At upstream corporate limits, Town of Wilson | 17.30 | 1,975 | 2,850 | 3,200 | 4,275 |
| At North Ridge Road | 16.90 | 1,680 | 2,300 | 2,600 | 3,370 |
| TWELVEMILE CREEK EAST BRANCH EAST TRIBUTARY | | | | | |
| At confluence with Twelvemile Creek, East Branch | 3.00 | 420 | 630 | 694 | 960 |
| At Irish Road | 2.30 | 380 | 570 | 630 | 880 |
| TWELVEMILE CREEK EAST BRANCH SOUTH TRIBUTARY | | | | | |
| At confluence with Twelvemile Creek, East Branch | 1.55 | 240 | 360 | 410 | 570 |
| At upstream corporate limits, Town of Wilson | 0.67 | 135 | 200 | 220 | 315 |
| TWELVEMILE CREEK TRIBUTARY 3 | | | | | |
| Upstream of confluence with Twelvemile Creek | 8.50 | 900 | 1,220 | 1,400 | 1,800 |
| At Balmer Road | 7.00 | 760 | 1,020 | 1,180 | 1,500 |
| At Dickersonville Road | 5.20 | 580 | 800 | 900 | 1,150 |
| At southern corporate limits, Town of Porter | 4.80 | 540 | 740 | 830 | 1,070 |

TABLE 7 – SUMMARY OF DISCHARGES
(Continued)

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (sq. miles) | PEAK DISCHARGES (cfs) 10-PERCENT | 2-PERCENT | 1-PERCENT | 0.2-PERCENT |
|---|---|---|---|---|---|
| TWELVEMILE CREEK TRIBUTARY 3A | | | | | |
| At confluence with Twelvemile Creek Tributary T3 | 1.80 | 90 | 110 | 125 | 140 |
| At southern corporate limit of the Town of Porter | 1.40 | 180 | 250 | 280 | 360 |
| Approximately 500' downstream of railroad culvert | 0.90[1] | 45[1] | 55[1] | 65[1] | 75[1] |
| Downstream face of railroad culvert | 0.80[1] | 35[1] | 40[1] | 45[1] | 50[1] |
| Upstream face of railroad culvert | 0.80[1] | 80[1] | 120[1] | 130[1] | 160[1] |
| 1,200' upstream of railroad culvert | 1.00 | 140 | 190 | 210 | 270 |

[1] Restriction in flow due to railroad culvert

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the source studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data Tables in the FIS report. For construction and/or floodplain management purposes, users are encouraged to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

**Precountywide Analyses**

Each jurisdiction within Niagara County, with the exceptions of the towns of Hartland and Royalton has a previously printed FIS report. The hydraulic analyses described in those reports have been compiled and are summarized below.

For streams studied by detailed methods, water-surface elevations of floods of the selected recurrence intervals were predominantly computed through the use of the USACE HEC-2 step-backwater program (USACE, 1976; 1974). Cross sections for the backwater analyses of the streams studied in detail were field-surveyed and located at close intervals above and below bridges and culverts, in order to compute the significant backwater effects of these structures in highly urbanized areas.

Starting water-surface elevations for Eighteenmile Creek were obtained from the 50-percent annual chance water surface level of Lake Ontario in the towns of Lockport and Newfane, and were determined using the slope-area method in the City of Lockport.

Starting water-surface elevations for Eighteenmile Creek, East Branch, were taken from the Eighteenmile Creek profiles in the towns of Lockport and Newfane.

Starting water surface elevations for Gill Creek were determined using the slope-area method in the City of Niagara Falls and the Town of Niagara. Starting water-surface elevations for Golden Hill Creek were obtained from the 50-percent annual chance water surface level of Lake Ontario.

Starting water surface elevations for Tonawanda Creek were determined using the 50-percent annual chance water surface elevation of the Niagara River – Tonawanda Channel in the City of North Tonawanda. In the Town of Wheatfield, starting elevations were taken from a rating curve determined by Parsons, Brinckerhoff, Quade and Douglas. In the Towns of Lockport and Pendleton, starting elevations were taken from a rating curve developed by the USACE in 1967.

Starting water-surface elevations for Twelvemile Creek were determined using the 50-percent annual chance water-surface elevation of Lake Ontario in the Town of Wilson, while in the Town of Porter the slope-area method was used. Starting water surface elevations for Twelvemile Creek, East Branch were also determined using the 50-percent annual chance water-surface elevation of Lake Ontario in the Town of Wilson, while in the Town of Cambria the slope-area method was used.

In the City of Lockport, starting water-surface elevations for Fish Creek 1 were determined by the critical depths at the outfall immediately downstream of the Robert Moses Parkway Bridge. Starting water-surface elevations for Gulf Branch were obtained from the profiles for Eighteenmile Creek. Water-surface elevations for the inlet ends of the Lincoln Avenue Branch culvert and Eighteenmile Creek culvert were obtained from a stage-discharge rating curve.

In the Town of Lockport, starting water surface elevations for Gulf Tributary were taken from the profiles for Gulf Branch. Starting water-surface elevations for Eighteenmile Creek Tributary East and Eighteenmile Creek Tributary West were determined using the slope-area method.

In the Village of Middleport, starting water-surface elevations for Johnson Creek 2 and Johnson Creek 2 Tributary 1 were determined using the slope-area method. For Johnson Creek 2 Tributary 1, the 20 cfs capacity of the underground culvert was subtracted from each of the peak flood discharges.

In the Town of Newfane, starting water surface elevations for Hopkins Creek and Keg Creek were based upon a 50-percent annual chance flood frequency level of Lake Ontario.

In the Town of Niagara, starting water-surface elevations for Gill Creek East Tributary were taken from the flood profiles for Gill Creek.

In the Town of Pendleton, starting water-surface elevations for the Erie Canal and Mud Creek were obtained from the profiles for Tonawanda Creek. Starting water-surface elevations for North Tonawanda Creek were obtained from the profiles for the Erie Canal.

In the Town of Porter, starting water-surface elevations for Twelvemile Creek Tributary 3, Twelvemile Creek Tributary 3A and Beaver Creek were obtained from the profiles for Twelvemile Creek. Starting water-surface elevations for Beaver Creek Tributary 1 were obtained from the profiles for Beaver Creek.

In the Town of Somerset, starting water-surface elevations for Fish Creek 2 were based upon the 50-percent annual chance flood elevation of Lake Ontario.

In the Town of Wheatfield, starting water-surface elevations for Brent Road Tributary and Raymond Road Tributary were obtained from the profiles for Bergholtz Creek.

In the town of Wilson, starting water-surface elevations for Twelvemile Creek, East Branch Tributary East and Twelvemile Creek, East Branch Tributary South were obtained from the profiles for Twelvemile Creek, East Branch.

**September 17, 2010**
**Initial Countywide FIS**

Information on the methods used to determine peak discharge-frequency relationships for the streams listed in Table 3, restudied as part of this countywide FIS, is shown below.

Water-surface elevations of floods of the selected recurrence intervals were computed through the use of the USACE HEC-RAS step-backwater program.

For Bergholtz Creek, in the City of Niagara Falls and towns of Cambria and Wheatfield, starting water-surface elevations were taken from the profiles for Cayuga Creek at its confluence with Bergholtz Creek. For this study, a total of 182 cross sections, including 38 structures were modeled. Structures included 26 bridges, 13 culverts and two miscellaneous structures.

For Bull Creek, in the City of North Tonawanda and the towns of Cambria, Pendleton and Wheatfield, starting water-surface elevations were derived from the HEC-RAS program using the Normal Depth boundary condition. For this study, a total of 128 cross sections, including 25 structures were modeled. Structures included 21 bridges, two culverts and two miscellaneous structures.

For Cayuga Creek, in the City of Niagara Falls and Town of Niagara, starting watersurface elevations were taken from the profiles of selected recurrence intervals from the effective FIS from the City of Niagara Falls (FEMA, September 1990), where the effective study met the revised downstream limit of detailed study. For this study, a total of 32 cross sections, including five structures were modeled. Structures included four bridges and one miscellaneous structure.

For Cayuga Creek West Tributary in the Town of Niagara, starting water-surface elevations were derived from the HEC-RAS program using the Normal Depth boundary condition. For this study, a total of 51 cross sections, including nine structures, were modeled. Structures included three bridges, five culverts and one miscellaneous structure. A separate HEC-RAS model is created for stormwater existing main stem via a right overbank lateral weir flow. Diverted flows are conveyed by Cayuga Creek West Tributary Diversion and eventually discharge into Cayuga Creek through an underground culvert running along Porter Road. Starting water-surface elevation, for this diversion, was derived from the HEC-RAS program using the Normal Depth boundary condition.

For Donner Creek, in the City of Lockport and Town of Lockport, starting water-surface elevations were taken from the profiles of selected recurrence intervals from the effective FIS from the Town of Lockport (FEMA, October 2002), where the effective study met the revised downstream limit of detailed study. For this study, a total of 34 cross sections, including seven structures, were modeled. Structures included one bridge, five culverts and one miscellaneous structure.

For Sawyer Creek, in the City of Tonawanda and Town of Wheatfield, the stream was divided into East and West portions based on the direction of flow.

For Sawyer Creek East, starting water surface elevations were derived from the HECRAS program using the Normal Depth boundary condition. For this study, 162 cross sections, including 42 structures were modeled.

For Sawyer Creek West, starting water surface elevations were derived from the HECRAS program using the Normal Depth boundary condition. For this study, 122 cross sections, including 34 structures were modeled.

For Town Ditch No. 2, in the Town of Pendleton, starting water surface elevations were derived from the HEC-RAS program using the Normal Depth boundary condition. For this study, 57 cross sections, including 15 structures were modeled. Structures included 10 bridges and five culverts.

For Tonawanda Creek, hydraulic data was taken from the FIS for the Town of Amherst in Erie County, New York. Water surface elevations were computed using HEC-2. During the delineation of increased elevations on North Tonawanda Creek, which is influenced by the Erie Canal and Tonawanda Creek, no evidence existed to verify that the culvert at North Tonawanda Creek Boulevard acted as an energy dissipater. Therefore, elevations on North Tonawanda Creek were linearly interpolated between East Canal Road and North Tonawanda Creek Boulevard.

Flood profiles were drawn showing computed water surface elevations for floods of the selected recurrence intervals.

Channel roughness factors (Manning's "n") for these hydraulic computations were assigned on the basis of field inspection of floodplain areas and the study of past floods. Channel roughness factors for streams studied by detailed methods are listed in Table 8, "Manning's "n" Values."

TABLE 8 – MANNING'S "n" VALUES

| Stream | Channel "n" | Overbank "n" |
|---|---|---|
| Beaver Creek | 0.025-0.045 | 0.050-0.100 |
| Beaver Creek Tributary 1 | 0.025-0.035 | 0.040-0.100 |
| Bergholtz Creek | 0.045-0.050 | 0.040-0.100 |
| Brent Road Tributary | 0.030-0.035 | 0.050-0.065 |
| Bull Creek | 0.040 | 0.030-0.100 |
| Bull Creek Tributary | 0.035 | 0.075 |

TABLE 8 – MANNING'S "n" VALUES
(Continued)

| Stream | Channel "n" | Overbank "n" |
|---|---|---|
| Cayuga Creek | 0.045 | 0.040-0.100 |
| Cayuga Creek Tributary | 0.030-0.035 | 0.050-0.065 |
| Cayuga Creek West Tributary | 0.040-0.045 | 0.030-0.100 |
| Donner Creek | 0.045-0.050 | 0.035-0.150 |
| Eighteenmile Creek | 0.030-0.040 | 0.060-0.080 |
| Eighteenmile Creek, East Branch | 0.030-0.040 | 0.060-0.080 |
| Eighteenmile Creek, East Tributary | 0.030 | 0.060 |
| Eighteenmile Creek, West Tributary | 0.030 | 0.060 |
| Erie Canal | 0.030 | 0.060 |
| Fish Creek (Lewiston) | 0.014-0.030 | 0.085 |
| Fish Creek (Somerset) | 0.030 | 0.080 |
| Gill Creek | 0.030-0.040 | 0.040-0.100 |
| Gill Creek East Tributary | 0.030-0.040 | 0.070 |
| Golden Hill Creek | 0.030 | 0.080 |
| Gulf Branch | 0.030 | 0.060-0.070 |
| Gulf Tributary | 0.030 | 0.060 |
| Hopkins Creek | 0.030-0.040 | 0.060 |
| Johnson Creek 2 | 0.015-0.037 | 0.045-0.120 |
| Johnson Creek 2 Tributary 1 | 0.035 | 0.040-0.100 |
| Keg Creek | 0.030-0.040 | 0.060 |
| Mud Creek | 0.030-0.040 | 0.050-0.120 |
| North Tonawanda Creek | 0.030 | 0.060 |
| Raymond Road Tributary | 0.030-0.035 | 0.050-0.065 |
| Sawyer Creek East | 0.045 | 0.030-0.100 |
| Sawyer Creek West | 0.040 | 0.030-0.100 |
| Tonawanda Creek | 0.020-0.055 | 0.040-0.110 |
| Town Ditch No. 2 | 0.045 | 0.035-0.100 |
| Twelvemile Creek | 0.025-0.042 | 0.040-0.120 |
| Twelvemile Creek East Branch | 0.030-0.040 | 0.050-0.120 |
| Twelvemile Creek East Branch Tributary East | 0.040 | 0.100 |
| Twelvemile Creek East Branch Tributary South | 0.040-0.050 | 0.100-0.150 |
| Twelvemile Creek Tributary 3 | 0.027-0.040 | 0.040-0.100 |
| Twelvemile Creek Tributary 3A | 0.020-0.040 | 0.040-0.100 |

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross sections are also shown on the FIRM (Exhibit 2).

All qualifying bench marks within a given jurisdiction that are cataloged by the National Geodetic Survey (NGS) and entered into the National Spatial Reference System (NSRS) as First or Second Order Vertical and have a vertical stability classification of A, B, or C are shown and labeled on the FIRM with their 6-character NSRS Permanent Identifier.

Bench marks cataloged by the NGS and entered into the NSRS vary widely in vertical stability classification. NSRS vertical stability classifications are as follows:

- Stability A: Monuments of the most reliable nature, expected to hold position/elevation well (e.g., mounted in bedrock)
- Stability B: Monuments which generally hold their position/elevation well (e.g., concrete bridge abutment)
- Stability C: Monuments which may be affected by surface ground movements (e.g., concrete monument below frost line)
- Stability D: Mark of questionable or unknown vertical stability (e.g., concrete monument above frost line, or steel witness post)

In addition to NSRS bench marks, the FIRM may also show vertical control monuments established by a local jurisdiction; these monuments will be shown on the FIRM with the appropriate designations. Local monuments will only be placed on the FIRM if the community has requested that they be included, and if the monuments meet the aforementioned NSRS inclusion criteria.

To obtain current elevation, description, and/or location information for bench marks shown on the FIRM for this jurisdiction, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their Web site at www.ngs.noaa.gov.

It is important to note that temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with this FIS and FIRM. Interested individuals may contact FEMA to access this data.

**TBD**
**Revised Countywide FIS**

For Tonawanda Creek, the hydraulic analysis was undertaken to address technical discrepancies with the hydraulic model and method changes utilized for developing the Base Flood Elevations (BFEs) and the 1-percent annual chance floodplain boundaries of Tonawanda Creek.

CRA Infrastructure & Engineering, Inc. updated the hydraulic model program of Tonawanda Creek from HEC-2 to HEC-RAS between stations 166 and 724.5 (Stations 16600 - 72450 in this FIS/FIRM), as reported in Floodplain Hydraulic Analysis Tonawanda Creek, Town of Pendleton, Niagara County, NY. CRA obtained the new Light Detection and Ranging (LiDAR) from FEMA and used the data to develop the topographic contours for defining the floodplain boundaries.

The work involved extending the cross sections to the limits of Town Ditch No. 2 and into the Town of Amherst (Erie County) side of the 1-percent annual chance floodplain for Tonawanda Creek. The cross sections were also updated with LiDAR points and extended the cross sections to a point beyond the 1-percent annual chance floodplain boundary.

The conversion from HEC-2 to HEC-RAS included adjusting the creek surface location but did not move the bridge information, which caused the bridges to be situated outside of the embankments of the stream. Once the changes to the input data were made, the results were compared to the water surface elevations of the HEC-2 model to confirm the models were consistent. The model was then adjusted to represent the vertical datum change from NGVD29 to NAVD88. The HEC-RAS model was also geo-referenced.

Floodplain Hydraulic Analysis Tonawanda Creek, Town of Pendleton, Niagara County, NY does not state that the starting water surface elevations for Tonawanda Creek were updated for this revision. The starting water surface elevations were previously determined using the 50-percent annual chance water surface elevation of the Niagara River – Tonawanda Channel in the City of North Tonawanda. In the Town of Wheatfield, starting elevations were taken from a rating curve determined by Parsons, Brinckerhoff, Quade and Douglas. In the Towns of Lockport and Pendleton, starting elevations were taken from a rating curve developed by the USACE in 1967.

Manning's "n" values for the channel range from 0.023 – 0.055. Manning's "n" values for the overbanks range from 0.04 - 0.085.

For Town Ditch No. 2, CRA examined the existing conditions and the backwater elevations in order to verify the highest water surface for a 1-percent annual chance flood. The hydraulic model of Town Ditch No. 2 was obtained to determine the extents of the cross sections and to determine if the Tonawanda Creek base flood elevations were at an elevation greater than the Town Ditch No. 2 base flood elevations.

A HEC-RAS model (Version 4.1) was prepared to calculate water surface elevations at cross sections spaced along the 1-percent annual chance floodplain. Based upon a review of the model results, the elevations for Tonawanda Creek were calculated as higher than that of Town Ditch No. 2. The cross sections were extended and LiDAR data was used to update the cross sections in the model, but due to limitations of LiDAR, the cross section information below the water surface was obtained from the previous HEC-2 model. The final cross sections were very similar to the existing cross sections, but were extended to the limits of the floodplain.

Floodplain Hydraulic Analysis Tonawanda Creek, Town of Pendleton, Niagara County, NY does not state that the starting water surface elevations and Manning's "n" values for Town Ditch No. 2 were updated for this revision.

Hydraulic analyses for Erie Canal and North Tonawanda Creek were not performed for this revision. However, backwater from the revised Tonawanda Creek study did affect portions of Erie Canal and North Tonawanda Creek.

## 3.3 Vertical Datum

All FISs and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FISs and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the finalization of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in difference in BFEs across the corporate limits between the communities. The conversion factor used for Niagara County is -0.50 feet for conversion from NGVD29 to NAVD88.

For more information on NAVD88, see Converting the National Flood Insurance Program to the North American Vertical Datum of 1988, FEMA Publication FIA-20/June 1992, or contact the Vertical Network Branch, National Geodetic Survey, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, Rockville, Maryland 20910 (Internet address http://www.ngs.noaa.gov).

## 4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. To assist in this endeavor, each FIS provides 1-percent annual chance floodplain data, which may include a combination of the following: 10-, 2-, 1-, and 0.2-percent annual chance flood elevations; delineations of the 1- and 0.2-percent annual chance floodplains; and 1-percent annual chance floodway. This information is presented on the FIRM and in many components of the FIS, including Flood Profiles, Floodway Data tables, and Summary of Stillwater Elevation tables. Users should reference the data presented in the FIS as well as additional information that may be available at the local community map repository before making flood elevation and/or floodplain boundary determinations.

### 4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance flood is employed to indicate additional areas of flood risk in the county. For the streams studied in detail, the 1- and 0.2-percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section.

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 1-percent-annual chance floodplain boundary corresponds to the boundary of areas of special flood hazards (Zones A, AE, V and VE); and the 0.2-percent-annual-chance flood boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent annual chance floodplain boundaries are close together, only the 1-percent annual chance floodplain boundary has been shown. Small areas within floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 1-percent annual chance floodplain boundary is shown on the FIRM (Exhibit 2).

### 4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent annual chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent annual chance flood can be carried without substantial

increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this FIS are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this FIS were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain.

Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 9). The computed floodways are shown on the FIRM (Exhibit 2). In cases where the floodway and 1-percent annual chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

Portions of the floodways for the Niagara River, Niagara River – Tonawanda Channel and Tonawanda Creek extend beyond the County boundary.

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage, and heightens potential flood hazards by further increasing velocities. A listing of stream velocities at selected cross sections is provided in Table 9, "Floodway Data." In order to reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside the floodway.

The area between the floodway and 1-percent annual chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent annual chance flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.

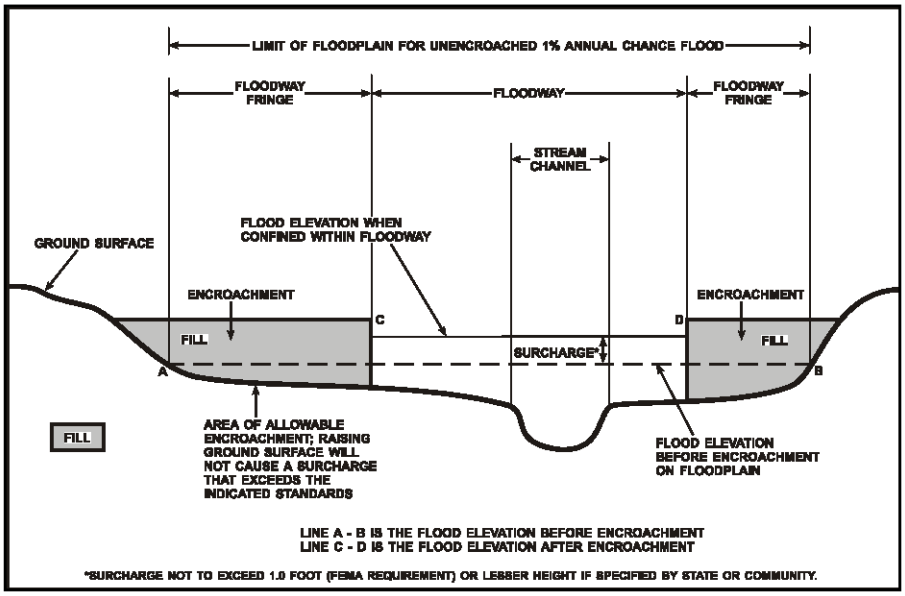



FIGURE 1 – FLOODWAY SCHEMATIC

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| BEAVER CREEK | | | | | | | | |
| A | 460[1] | 83 | 497 | 2.9 | 304.1 | 304.1 | 305.1 | 1.0 |
| B | 5240[1] | 30 | 219 | 3.8 | 311.3 | 311.3 | 312.1 | 0.8 |
| C | 8000[1] | 29 | 179 | 4.6 | 315.3 | 315.3 | 316.1 | 0.8 |
| D | 9700[1] | 35 | 193 | 3.8 | 318.5 | 318.5 | 319.2 | 0.7 |
| E | 12580[1] | 79 | 372 | 2.0 | 323.9 | 323.9 | 324.8 | 0.9 |
| BEAVER CREEK TRIBUTARY B-1 | | | | | | | | |
| A | 500[2] | 46 | 115 | 0.8 | 318.4 | 318.4 | 319.1 | 0.7 |
| B | 1300[2] | 9 | 27 | 3.3 | 320.2 | 320.2 | 321.0 | 0.8 |
| BERGHOLTZ CREEK | | | | | | | | |
| A | 270[3] | 101 | 707 | 1.6 | 570.2 | 570.2 | 571.2 | 1.0 |
| B | 1191[3] | 119 | 838 | 1.3 | 570.5 | 570.5 | 571.4 | 0.9 |
| C | 1402[3] | 87 | 622 | 1.8 | 570.7 | 570.7 | 571.6 | 0.9 |
| D | 1948[3] | 90 | 729 | 1.5 | 570.9 | 570.9 | 571.7 | 0.8 |
| E | 2107[3] | 94 | 630 | 1.8 | 570.9 | 570.9 | 571.8 | 0.9 |
| F | 3280[3] | 124 | 873 | 1.3 | 571.3 | 571.3 | 572.0 | 0.7 |
| G | 4266[3] | 66 | 541 | 2.1 | 571.5 | 571.5 | 572.2 | 0.7 |
| H | 4921[3] | 85 | 711 | 1.6 | 571.7 | 571.7 | 572.4 | 0.7 |
| I | 5155[3] | 60 | 527 | 2.1 | 571.8 | 571.8 | 572.5 | 0.7 |
| J | 6117[3] | 66 | 523 | 2.1 | 572.1 | 572.1 | 573.0 | 0.9 |
| K | 6781[3] | 133 | 1129 | 1.0 | 572.2 | 572.2 | 573.1 | 0.9 |
| L | 7016[3] | 62 | 450 | 2.5 | 572.3 | 572.3 | 573.2 | 0.9 |
| M | 7710[3] | 224 | 1304 | 0.9 | 572.6 | 572.6 | 573.4 | 0.8 |

[1] Feet above confluence with Twelvemile Creek
[2] Feet above confluence with Beaver Creek
[3] Feet above confluence with Cayuga Creek



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**BEAVER CREEK – BEAVER CREEK TRIBUTARY B-1 – BERGHOLTZ CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| BERGHOLTZ CREEK (CONTINUED) | | | | | | | | |
| N | 8553 | 205 | 1163 | 1.0 | 572.7 | 572.7 | 573.5 | 0.8 |
| O | 9114 | 85 | 829 | 1.3 | 572.7 | 572.7 | 573.5 | 0.8 |
| P | 9365 | 84 | 668 | 1.6 | 573.0 | 573.0 | 573.8 | 0.8 |
| Q | 10258 | 117 | 533 | 1.8 | 573.2 | 573.2 | 574.0 | 0.8 |
| R | 10953 | 86 | 392 | 2.5 | 573.6 | 573.6 | 574.3 | 0.7 |
| S | 11409 | 70 | 518 | 1.9 | 575.1 | 575.1 | 575.7 | 0.6 |
| T | 11811 | 181 | 1202 | 0.8 | 575.2 | 575.2 | 575.8 | 0.6 |
| U | 12046 | 62 | 459 | 2.1 | 575.2 | 575.2 | 575.9 | 0.7 |
| V | 12784 | 55 | 417 | 2.3 | 575.6 | 575.6 | 576.3 | 0.7 |
| W | 13051 | 93 | 570 | 1.7 | 576.0 | 576.0 | 576.6 | 0.6 |
| X | 13687 | 147 | 740 | 1.3 | 576.0 | 576.0 | 576.8 | 0.8 |
| Y | 14416 | 152 | 837 | 1.2 | 576.1 | 576.1 | 576.9 | 0.8 |
| Z | 14572 | 129 | 691 | 1.4 | 576.1 | 576.1 | 576.9 | 0.8 |
| AA | 15067 | 100 | 536 | 1.8 | 576.2 | 576.2 | 577.1 | 0.9 |
| AB | 15253 | 42 | 278 | 3.5 | 576.5 | 576.5 | 577.3 | 0.8 |
| AC | 15686 | 48 | 276 | 3.5 | 577.2 | 577.2 | 577.9 | 0.7 |
| AD | 15974 | 74 | 463 | 2.1 | 577.8 | 577.8 | 578.6 | 0.8 |
| AE | 16158 | 61 | 431 | 2.3 | 578.1 | 578.1 | 578.9 | 0.8 |
| AF | 17047 | 147 | 844 | 1.2 | 578.3 | 578.3 | 579.2 | 0.9 |
| AG | 17225 | 185 | 1047 | 0.9 | 578.4 | 578.4 | 579.3 | 0.9 |
| AH | 18314 | 636 | 3267 | 0.3 | 578.4 | 578.4 | 579.3 | 0.9 |
| AI | 19135 | 1230 | 5035 | 0.2 | 578.4 | 578.4 | 579.3 | 0.9 |
| AJ | 19378 | 1341 | 4793 | 0.2 | 578.4 | 578.4 | 579.4 | 1.0 |
| AK | 20268 | 1275 | 4425 | 0.2 | 578.4 | 578.4 | 579.4 | 1.0 |

[1] Feet above confluence with Cayuga Creek



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**BERGHOLTZ CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| BERGHOLTZ CREEK (CONTINUED) | | | | | | | | |
| AL | 21037 | 594 | 1980 | 0.5 | 578.4 | 578.4 | 579.4 | 1.0 |
| AM | 21534 | 110 | 435 | 2.2 | 578.4 | 578.4 | 579.4 | 1.0 |
| AN | 22280 | 31 | 206 | 4.7 | 579.8 | 579.8 | 580.5 | 0.7 |
| AO | 22462 | 78 | 424 | 2.3 | 580.2 | 580.2 | 581.2 | 1.0 |
| AP | 23059 | 110 | 499 | 2.0 | 580.6 | 580.6 | 581.5 | 0.9 |
| AQ | 23310 | 38 | 260 | 3.2 | 580.7 | 580.7 | 581.6 | 0.9 |
| AR | 23506 | 161 | 893 | 0.9 | 581.2 | 581.2 | 582.2 | 1.0 |
| AS | 24655 | 96 | 395 | 2.1 | 581.3 | 581.3 | 582.3 | 1.0 |
| AT | 25430 | 78 | 438 | 1.9 | 582.0 | 582.0 | 583.0 | 1.0 |
| AU | 26632 | 212 | 731 | 1.2 | 583.0 | 583.0 | 584.0 | 1.0 |
| AV | 27547 | 133 | 437 | 1.9 | 584.6 | 584.6 | 585.5 | 0.9 |
| AW | 28132 | 119 | 544 | 1.5 | 585.3 | 585.3 | 586.2 | 0.9 |
| AX | 28461 | 73 | 343 | 2.4 | 586.2 | 586.2 | 586.8 | 0.6 |
| AY | 29280 | 50 | 260 | 3.2 | 587.9 | 587.9 | 588.8 | 0.9 |
| AZ | 29616 | 54 | 330 | 2.5 | 589.6 | 589.6 | 590.2 | 0.6 |
| BA | 29772 | 52 | 346 | 2.4 | 590.0 | 590.0 | 590.6 | 0.6 |
| BB | 30435 | 75 | 468 | 1.8 | 590.4 | 590.4 | 591.2 | 0.8 |
| BC | 30853 | 93 | 563 | 1.5 | 590.6 | 590.6 | 591.5 | 0.9 |
| BD | 31260 | 136 | 788 | 1.1 | 590.8 | 590.8 | 591.7 | 0.9 |
| BE | 31555 | 77 | 475 | 1.8 | 591.1 | 591.1 | 592.1 | 1.0 |
| BF | 31745 | 110 | 815 | 1.0 | 594.0 | 594.0 | 595.0 | 1.0 |
| BG | 32164 | 144 | 1007 | 0.8 | 594.0 | 594.0 | 595.0 | 1.0 |
| BH | 32359 | 165 | 1192 | 0.7 | 594.1 | 594.1 | 595.1 | 1.0 |
| BI | 32814 | 177 | 1301 | 0.6 | 594.2 | 594.2 | 595.2 | 1.0 |

[1] Feet above confluence with Cayuga Creek



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**BERGHOLTZ CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| BERGHOLTZ CREEK (CONTINUED) | | | | | | | | |
| BJ | 33759 | 157 | 857 | 1.0 | 594.3 | 594.3 | 595.3 | 1.0 |
| BK | 34617 | 104 | 516 | 1.6 | 595.0 | 595.0 | 595.8 | 0.8 |
| BL | 35445 | 154 | 727 | 1.2 | 595.6 | 595.6 | 596.4 | 0.8 |
| BM | 36919 | 117 | 461 | 1.8 | 596.6 | 596.6 | 597.5 | 0.9 |
| BN | 38203 | 135 | 678 | 1.2 | 598.0 | 598.0 | 598.9 | 0.9 |
| BO | 39217 | 102 | 370 | 2.3 | 598.6 | 598.6 | 599.5 | 0.9 |
| BP | 40243 | 117 | 462 | 1.0 | 599.4 | 599.4 | 600.4 | 1.0 |
| BQ | 40440 | 92 | 483 | 0.9 | 603.0 | 603.0 | 603.8 | 0.8 |
| BR | 41922 | 104 | 447 | 1.0 | 603.4 | 603.4 | 604.4 | 1.0 |
| BS | 43564 | 55 | 181 | 2.5 | 604.5 | 604.5 | 605.4 | 0.9 |
| BT | 44766 | 42 | 140 | 3.2 | 606.6 | 606.6 | 607.4 | 0.8 |
| BU | 44936 | 44 | 167 | 2.7 | 607.2 | 607.2 | 608.0 | 0.8 |
| BV | 45126 | 71 | 258 | 1.7 | 609.0 | 609.0 | 609.2 | 0.2 |
| BW | 45671 | 82 | 289 | 1.5 | 609.2 | 609.2 | 609.5 | 0.3 |
| BX | 45867 | 180 | 599 | 0.7 | 610.2 | 610.2 | 610.4 | 0.2 |
| BY | 46417 | 267 | 560 | 0.8 | 610.2 | 610.2 | 610.5 | 0.3 |
| BZ | 46950 | 95 | 322 | 1.4 | 610.3 | 610.3 | 610.6 | 0.3 |
| CA | 47148 | 120 | 520 | 0.9 | 612.2 | 612.2 | 613.2 | 1.0 |
| CB | 48361 | 38 | 64 | 6.9 | 613.0 | 613.0 | 613.1 | 0.1 |
| CC | 48529 | 78 | 326 | 1.4 | 618.1 | 618.1 | 618.4 | 0.3 |
| CD | 49835 | 31 | 52 | 7.4 | 619.1 | 619.1 | 619.1 | 0.0 |
| CE | 50070 | 55 | 241 | 1.6 | 623.7 | 623.7 | 624.1 | 0.4 |
| CF | 50801 | 90 | 389 | 1.0 | 623.9 | 623.9 | 624.3 | 0.4 |
| CG | 51460 | 88 | 362 | 1.1 | 623.9 | 623.9 | 624.4 | 0.5 |

[1] Feet above confluence with Cayuga Creek



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**BERGHOLTZ CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| BERGHOLTZ CREEK (CONTINUED) | | | | | | | | |
| CH | 53062[1] | 71 | 164 | 2.4 | 624.4 | 624.4 | 625.1 | 0.7 |
| CI | 54263[1] | 66 | 247 | 1.6 | 625.8 | 625.8 | 626.3 | 0.5 |
| CJ | 54464[1] | 96 | 424 | 0.9 | 628.3 | 628.3 | 629.1 | 0.8 |
| CK | 55229[1] | 201 | 784 | 0.5 | 628.3 | 628.3 | 629.2 | 0.9 |
| CL | 56248[1] | 246 | 762 | 0.5 | 628.4 | 628.4 | 629.2 | 0.8 |
| CM | 56419[1] | 199 | 625 | 0.6 | 628.4 | 628.4 | 629.2 | 0.8 |
| CN | 57001[1] | 95 | 241 | 1.6 | 628.5 | 628.5 | 629.3 | 0.8 |
| CO | 57162[1] | 85 | 261 | 1.5 | 628.6 | 628.6 | 629.5 | 0.9 |
| CP | 58230[1] | 80 | 185 | 2.1 | 629.6 | 629.6 | 630.2 | 0.6 |
| CQ | 58421[1] | 75 | 155 | 2.5 | 629.9 | 629.9 | 630.8 | 0.9 |
| CR | 59536[1] | 188 | 431 | 0.9 | 630.9 | 630.9 | 631.9 | 1.0 |
| CS | 60488[1] | 265 | 656 | 0.6 | 631.1 | 631.1 | 632.0 | 0.9 |
| CT | 60644[1] | 237 | 698 | 0.6 | 631.1 | 631.1 | 632.0 | 0.9 |
| CU | 60933[1] | 256 | 1149 | 0.3 | 631.1 | 631.1 | 632.1 | 1.0 |
| CV | 61145[1] | 283 | 1229 | 0.3 | 631.1 | 631.1 | 632.1 | 1.0 |
| CW | 61739[1] | 314 | 960 | 0.4 | 631.1 | 631.1 | 632.1 | 1.0 |
| BRENT ROAD TRIBUTARY | | | | | | | | |
| A | 220[2] | 40 | 91 | 4.9 | 585.8 | 584.3[3] | 584.3 | 0.0 |
| B | 570[2] | 40 | 118 | 3.8 | 585.8 | 585.2[3] | 585.5 | 0.3 |
| C | 730[2] | 36 | 116 | 3.8 | 585.8 | 585.5[3] | 585.8 | 0.3 |
| D | 1580[2] | 38 | 115 | 3.9 | 587.3 | 587.3 | 587.5 | 0.2 |

[1] Feet above confluence with Cayuga Creek
[2] Feet above mouth
[3] Elevation computed without consideration of backwater effects



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**BERGHOLTZ CREEK – BRENT ROAD TRIBUTARY**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| BULL CREEK | | | | | | | | |
| A | 176 | 71 | 536 | 3.0 | 575.0[2] | 568.7 | 569.1 | 0.4 |
| B | 1020 | 60 | 516 | 3.1 | 575.0[2] | 569.2 | 569.5 | 0.3 |
| C | 1880 | 50 | 458 | 3.5 | 575.0[2] | 569.5 | 570.0 | 0.5 |
| D | 2346 | 47 | 463 | 3.4 | 575.0[2] | 569.7 | 570.2 | 0.5 |
| E | 2844 | 57 | 513 | 3.1 | 575.0[2] | 570.0 | 570.6 | 0.6 |
| F | 3249 | 49 | 451 | 2.8 | 575.0[2] | 570.3 | 570.9 | 0.6 |
| G | 4184 | 58 | 492 | 2.5 | 575.0[2] | 570.5 | 571.4 | 0.9 |
| H | 5465 | 62 | 513 | 2.4 | 575.0[2] | 571.2 | 572.2 | 1.0 |
| I | 6234 | 62 | 538 | 2.3 | 575.0[2] | 571.7 | 572.7 | 1.0 |
| J | 7268 | 131 | 768 | 1.6 | 575.0[2] | 572.4 | 573.4 | 1.0 |
| K | 8004 | 76 | 613 | 2.0 | 575.0[2] | 573.1 | 574.0 | 0.9 |
| L | 8216 | 75 | 608 | 2.0 | 575.0[2] | 573.6 | 574.5 | 0.9 |
| M | 9154 | 122 | 915 | 1.4 | 575.0[2] | 574.2 | 575.1 | 0.9 |
| N | 9778 | 80 | 636 | 2.0 | 575.0[2] | 574.5 | 575.4 | 0.9 |
| O | 10451 | 161 | 1186 | 1.1 | 575.0[2] | 574.9 | 575.8 | 0.9 |
| P | 11189 | 175 | 1049 | 1.2 | 575.1 | 575.1 | 576.0 | 0.9 |
| Q | 12104 | 163 | 1122 | 1.1 | 575.4 | 575.4 | 576.2 | 0.8 |
| R | 12302 | 173 | 1075 | 1.2 | 576.0 | 576.0 | 576.8 | 0.8 |
| S | 14023 | 234 | 1063 | 1.2 | 576.2 | 576.2 | 577.2 | 1.0 |
| T | 14489 | 308 | 1427 | 0.9 | 576.5 | 576.5 | 577.4 | 0.9 |
| U | 15161 | 349 | 1793 | 0.7 | 576.6 | 576.6 | 577.5 | 0.9 |
| V | 15425 | 308 | 1158 | 1.1 | 576.6 | 576.6 | 577.6 | 1.0 |
| W | 15728 | 322 | 1738 | 0.7 | 576.7 | 576.7 | 577.7 | 1.0 |
| X | 16252 | 393 | 1708 | 0.7 | 576.9 | 576.9 | 577.8 | 0.9 |
| Y | 17969 | 358 | 1599 | 0.8 | 577.0 | 577.0 | 577.9 | 0.9 |

[1] Feet above confluence with Tonawanda Creek
[2] Elevation computed without consideration of backwater effects of Tonawanda Creek



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**BULL CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| BULL CREEK (CONTINUED) | | | | | | | | |
| Z | 18176 | 372 | 1603 | 0.6 | 577.2 | 577.2 | 578.2 | 1.0 |
| AA | 19747 | 242 | 1058 | 0.8 | 577.3 | 577.3 | 578.3 | 1.0 |
| AB | 21553 | 215 | 810 | 1.1 | 577.9 | 577.9 | 578.9 | 1.0 |
| AC | 21751 | 183 | 796 | 1.1 | 578.5 | 578.5 | 579.3 | 0.8 |
| AD | 22745 | 276 | 1020 | 0.9 | 578.8 | 578.8 | 579.8 | 1.0 |
| AE | 25175 | 176 | 802 | 1.1 | 579.9 | 579.9 | 580.8 | 0.9 |
| AF | 25571 | 131 | 613 | 1.4 | 580.2 | 580.2 | 581.1 | 0.9 |
| AG | 26211 | 170 | 664 | 1.3 | 580.3 | 580.3 | 581.3 | 1.0 |
| AH | 26874 | 178 | 760 | 1.2 | 580.7 | 580.7 | 581.6 | 0.9 |
| AI | 27052 | 192 | 761 | 1.2 | 580.8 | 580.8 | 581.8 | 1.0 |
| AJ | 27754 | 175 | 700 | 1.3 | 581.4 | 581.4 | 582.2 | 0.8 |
| AK | 28814 | 143 | 555 | 1.6 | 582.4 | 582.4 | 583.2 | 0.8 |
| AL | 29614 | 74 | 433 | 2.0 | 583.1 | 583.1 | 583.9 | 0.8 |
| AM | 29859 | 86 | 484 | 1.8 | 584.3 | 584.3 | 585.1 | 0.8 |
| AN | 30363 | 131 | 792 | 1.1 | 584.5 | 584.5 | 585.5 | 1.0 |
| AO | 30533 | 144 | 828 | 1.1 | 584.6 | 584.6 | 585.6 | 1.0 |
| AP | 30900 | 253 | 1133 | 0.8 | 584.7 | 584.7 | 585.7 | 1.0 |
| AQ | 31553 | 148 | 704 | 1.3 | 584.9 | 584.9 | 585.9 | 1.0 |
| AR | 32049 | 99 | 462 | 1.9 | 585.9 | 585.9 | 586.8 | 0.9 |
| AS | 32260 | 145 | 782 | 1.1 | 586.8 | 586.8 | 587.5 | 0.7 |
| AT | 33885 | 253 | 686 | 1.3 | 587.6 | 587.6 | 588.1 | 0.5 |
| AU | 35079 | 267 | 928 | 0.9 | 588.6 | 588.6 | 588.8 | 0.2 |
| AV | 36131 | 174 | 648 | 1.4 | 589.0 | 589.0 | 589.5 | 0.5 |
| AW | 36314 | 223 | 752 | 1.2 | 589.0 | 589.0 | 589.7 | 0.7 |

[1] Feet above confluence with Tonawanda Creek



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**BULL CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| BULL CREEK (CONTINUED) | | | | | | | | |
| AX | 36943[1] | 205 | 684 | 1.1 | 589.1 | 589.1 | 590.0 | 0.9 |
| AY | 38600[1] | 136 | 500 | 1.4 | 589.7 | 589.7 | 590.5 | 0.8 |
| AZ | 38868[1] | 217 | 785 | 0.9 | 589.7 | 589.7 | 590.6 | 0.9 |
| BA | 40354[1] | 196 | 627 | 1.1 | 590.0 | 590.0 | 590.9 | 0.9 |
| BB | 40497[1] | 342 | 1085 | 0.7 | 591.0 | 591.0 | 591.9 | 0.9 |
| BC | 41046[1] | 520 | 1459 | 0.5 | 591.1 | 591.1 | 592.0 | 0.9 |
| BD | 41852[1] | 560 | 1682 | 0.4 | 591.3 | 591.3 | 592.1 | 0.8 |
| BE | 42043[1] | 590 | 1826 | 0.4 | 591.3 | 591.3 | 592.3 | 1.0 |
| BF | 43248[1] | 338 | 769 | 0.9 | 591.3 | 591.3 | 592.3 | 1.0 |
| BG | 44465[1] | 261 | 535 | 1.3 | 591.9 | 591.9 | 592.9 | 1.0 |
| BH | 44687[1] | 55 | 280 | 2.6 | 595.0 | 595.0 | 595.2 | 0.2 |
| BI | 45257[1] | 112 | 457 | 1.6 | 595.0 | 595.0 | 595.5 | 0.5 |
| BJ | 46535[1] | 95 | 375 | 1.9 | 595.0 | 595.0 | 595.9 | 0.9 |
| BK | 47981[1] | 29 | 79 | 9.0 | 597.2 | 597.2 | 598.2 | 1.0 |
| BL | 49355[1] | 60 | 264 | 2.7 | 603.1 | 603.1 | 604.1 | 1.0 |
| BM | 49855[1] | 129 | 579 | 1.2 | 604.1 | 604.1 | 605.0 | 0.9 |
| BULL CREEK TRIBUTARY | | | | | | | | |
| A | 460[2] | 29 | 52 | 3.1 | 588.7 | 587.0[3] | 587.1 | 0.1 |
| B | 685[2] | 19 | 33 | 4.9 | 588.7 | 588.0[3] | 588.1 | 0.1 |
| C | 1435[2] | 40 | 157 | 1.0 | 591.0 | 591.0 | 591.1 | 0.1 |
| D | 2395[2] | 23 | 26 | 6.2 | 592.1 | 592.1 | 593.1 | 1.0 |
| E | 4285[2] | 30 | 77 | 1.5 | 594.4 | 594.4 | 594.5 | 0.1 |
| F | 5345[2] | 29 | 52 | 3.1 | 596.1 | 596.1 | 596.8 | 0.7 |

[1] Feet above confluence with Tonawanda Creek
[2] Feet above confluence with Bull Creek
[3] Elevation computed without consideration of backwater effects from Bull Creek



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**BULL CREEK – BULL CREEK TRIBUTARY**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| CAYUGA CREEK | | | | | | | | |
| A | 175 | 45 | 496 | 6.1 | 568.0 | 566.2[2] | 567.2 | 1.0 |
| B | 1465 | 75 | 876 | 3.5 | 568.0 | 567.1[2] | 567.9 | 0.8 |
| C | 3455 | 80 | 676 | 4.5 | 569.1 | 569.1 | 569.9 | 0.8 |
| D | 4545 | 95 | 944 | 3.2 | 569.8 | 569.8 | 573.6 | 3.8 |
| E | 6410 | 45 | 453 | 3.6 | 570.6 | 570.6 | 571.2 | 0.6 |
| F | 6707 | 34 | 306 | 3.3 | 570.5 | 570.5 | 571.1 | 0.6 |
| G | 6866 | 42 | 337 | 3.0 | 570.7 | 570.7 | 571.3 | 0.6 |
| H | 7663 | 114 | 767 | 1.3 | 571.0 | 571.0 | 571.6 | 0.6 |
| I | 8787 | 69 | 413 | 2.4 | 571.2 | 571.2 | 571.9 | 0.7 |
| J | 9967 | 49 | 329 | 3.0 | 572.4 | 572.4 | 573.0 | 0.6 |
| K | 10129 | 90 | 469 | 2.1 | 572.8 | 572.8 | 573.6 | 0.8 |
| L | 11084 | 40 | 266 | 3.8 | 573.8 | 573.8 | 574.5 | 0.7 |
| M | 12044 | 345 | 1222 | 0.8 | 574.1 | 574.1 | 575.0 | 0.9 |
| N | 12650 | 243 | 966 | 1.0 | 574.2 | 574.2 | 575.1 | 0.9 |
| O | 13000 | 52 | 322 | 3.1 | 574.2 | 574.2 | 575.2 | 1.0 |
| P | 13197 | 40 | 241 | 4.2 | 574.6 | 574.6 | 575.4 | 0.8 |
| Q | 13490 | 50 | 261 | 3.8 | 577.0 | 577.0 | 577.3 | 0.3 |
| R | 13901 | 93 | 478 | 2.1 | 578.4 | 578.4 | 578.7 | 0.3 |
| S | 14261 | 203 | 881 | 1.1 | 578.6 | 578.6 | 578.8 | 0.2 |
| T | 14647 | 183 | 1033 | 0.9 | 578.8 | 578.8 | 579.1 | 0.3 |
| U | 15846 | 59 | 338 | 2.7 | 578.8 | 578.8 | 579.2 | 0.4 |
| V | 16370 | 44 | 227 | 4.0 | 579.2 | 579.2 | 579.5 | 0.3 |
| W | 17096 | 39 | 269 | 3.4 | 581.7 | 581.7 | 581.8 | 0.1 |
| X | 17663 | 37 | 259 | 3.5 | 582.1 | 582.1 | 582.2 | 0.1 |
| Y | 18042 | 46 | 302 | 3.0 | 582.4 | 582.4 | 582.5 | 0.1 |

[1] Feet above confluence with Little Niagara River
[2] Elevation computed without consideration of backwater effects from Little Niagara River



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**CAYUGA CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| CAYUGA CREEK (CONTINUED) | | | | | | | | |
| Z | 19344 | 60 | 337 | 2.7 | 583.1 | 583.1 | 583.3 | 0.2 |
| AA | 20348 | 53 | 313 | 2.9 | 583.7 | 583.7 | 583.8 | 0.1 |
| AB | 20370 | 80 | 475 | 3.4 | 587.0 | 587.0 | 587.0 | 0.0 |
| AC | 21120 | 80 | 437 | 3.7 | 587.3 | 587.3 | 587.3 | 0.0 |
| AD | 21870 | 80 | 399 | 4.0 | 587.6 | 587.6 | 587.6 | 0.0 |
| AE | 22245 | 85 | 556 | 2.9 | 588.2 | 588.2 | 588.2 | 0.0 |
| AF | 23085 | 90 | 520 | 3.1 | 588.3 | 588.3 | 588.5 | 0.2 |
| AG | 25270 | 50 | 180 | 8.9 | 589.5 | 589.5 | 590.1 | 0.6 |
| AH | 25398 | 50 | 353 | 4.5 | 595.1 | 595.1 | 595.1 | 0.0 |
| AI | 25810 | 40 | 159 | 10.1 | 595.1 | 595.1 | 595.1 | 0.0 |
| AJ | 25960 | 40 | 285 | 5.6 | 597.5 | 597.5 | 597.5 | 0.0 |
| AK | 26660 | 65 | 431 | 3.7 | 598.0 | 598.0 | 598.2 | 0.2 |
| AL | 27090 | 52 | 171 | 9.3 | 599.6 | 599.6 | 599.6 | 0.0 |
| AM | 27270 | 65 | 604 | 2.6 | 604.1 | 604.1 | 604.1 | 0.0 |
| AN | 27810 | 45 | 273 | 5.9 | 604.1 | 604.1 | 604.1 | 0.0 |
| AO | 27985 | 50 | 446 | 3.6 | 608.2 | 608.2 | 608.2 | 0.0 |
| AP | 28745 | 90 | 349 | 4.6 | 608.4 | 608.4 | 608.4 | 0.0 |
| AQ | 29815 | 95 | 44 | 3.6 | 609.1 | 609.1 | 609.8 | 0.7 |
| AR | 30765 | 100 | 719 | 1.5 | 609.5 | 609.5 | 610.4 | 0.9 |
| AS | 31335 | 100 | 480 | 2.3 | 609.6 | 609.6 | 610.5 | 0.9 |
| AT | 31955 | 100 | 380 | 2.9 | 610.1 | 610.1 | 611.0 | 0.9 |
| AU | 32125 | 80 | 367 | 3.0 | 611.8 | 611.8 | 611.9 | 0.1 |
| AV | 32895 | 60 | 291 | 3.8 | 612.3 | 612.3 | 612.8 | 0.5 |
| AW | 33005 | 40 | 247 | 4.4 | 612.3 | 612.3 | 613.0 | 0.7 |

[1] Feet above confluence with Little Niagara River



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**CAYUGA CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| CAYUGA CREEK (CONTINUED) | | | | | | | | |
| AX | 33165[1] | 40 | 264 | 4.1 | 615.0 | 615.0 | 615.0 | 0.0 |
| AY | 33405[1] | 40 | 255 | 4.3 | 615.1 | 615.1 | 617.2 | 2.1 |
| AZ | 33545[1] | 40 | 269 | 4.0 | 615.2 | 615.2 | 615.4 | 0.2 |
| BA | 33715[1] | 65 | 391 | 2.8 | 615.2 | 615.2 | 615.6 | 0.4 |
| CAYUGA CREEK TRIBUTARY | | | | | | | | |
| A | 525[2] | 30 | 77 | 6.1 | 609.7 | 609.7 | 609.7 | 0.0 |
| B | 1160[2] | 30 | 143 | 3.2 | 610.7 | 610.7 | 611.6 | 0.9 |
| C | 2220[2] | 30 | 110 | 3.7 | 612.0 | 612.0 | 612.9 | 0.9 |
| D | 3000[2] | 30 | 122 | 3.3 | 613.0 | 613.0 | 613.9 | 0.9 |
| CAYUGA CREEK WEST TRIBUTARY | | | | | | | | |
| A | 111[3] | 16 | 22 | 2.8 | 578.6 | 575.3[4] | 575.3 | 0.0 |
| B | 693[3] | 15 | 19 | 3.3 | 578.6 | 578.4[4] | 578.4 | 0.0 |
| C | 1197[3] | 28 | 48 | 1.3 | 579.4 | 579.4 | 579.4 | 0.0 |
| D | 1446[3] | 32 | 69 | 0.9 | 579.7 | 579.7 | 579.7 | 0.0 |
| E | 2223[3] | 25 | 52 | 1.2 | 579.9 | 579.9 | 580.0 | 0.1 |
| F | 3433[3] | 21 | 40 | 1.5 | 580.7 | 580.7 | 580.7 | 0.0 |
| G | 5742[3] | 92 | 186 | 1.5 | 583.0 | 583.0 | 583.6 | 0.6 |
| H | 6321[3] | 192 | 563 | 0.5 | 585.5 | 585.5 | 586.5 | 1.0 |
| I | 6655[3] | 100 | 263 | 1.1 | 585.6 | 585.6 | 586.5 | 0.9 |
| J | 6894[3] | 55 | 130 | 2.2 | 585.8 | 585.8 | 586.6 | 0.8 |
| K | 7030[3] | 136 | 350 | 0.9 | 586.6 | 586.6 | 587.5 | 0.9 |

[1] Feet above confluence with Little Niagara River
[2] Feet above mouth
[3] Feet above confluence with Cayuga Creek
[4] Elevation computed without consideration of backwater effects from Cayuga Creek



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**CAYUGA CREEK – CAYUGA CREEK TRIBUTARY – CAYUGA CREEK WEST TRIBUTARY**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| CAYUGA CREEK WEST TRIBUTARY (CONTINUED) | | | | | | | | |
| L | 7225[1] | 133 | 400 | 0.7 | 586.6 | 586.6 | 587.6 | 1.0 |
| M | 7507[1] | 60 | 162 | 1.8 | 586.6 | 586.6 | 587.6 | 1.0 |
| N | 7986[1] | 35 | 107 | 2.7 | 587.3 | 587.3 | 587.9 | 0.6 |
| O | 8449[1] | 47 | 112 | 2.6 | 589.4 | 589.4 | 590.4 | 1.0 |
| P | 9908[1] | 72 | 56 | 5.1 | 597.0 | 597.0 | 597.0 | 0.0 |
| Q | 10284[1] | 47 | 94 | 3.1 | 599.8 | 599.8 | 600.3 | 0.5 |
| R | 10861[1] | 61 | 71 | 4.0 | 604.5 | 604.5 | 604.8 | 0.3 |
| S | 11275[1] | 56 | 210 | 0.4 | 610.0 | 610.0 | 610.6 | 0.6 |
| T | 11508[1] | 43 | 109 | 0.8 | 610.0 | 610.0 | 610.6 | 0.6 |
| U | 11780[1] | 27 | 18 | 4.6 | 611.4 | 611.4 | 611.4 | 0.0 |
| V | 11941[1] | 11 | 35 | 2.4 | 615.2 | 615.2 | 615.6 | 0.4 |
| W | 12254[1] | 26 | 24 | 3.4 | 616.7 | 616.7 | 616.9 | 0.2 |
| X | 12474[1] | 62 | 222 | 0.4 | 621.1 | 621.1 | 622.1 | 1.0 |
| Y | 12634[1] | 92 | 286 | 0.3 | 621.1 | 621.1 | 622.1 | 1.0 |
| CAYUGA CREEK WEST TRIBUTARY DIVERSION | | | | | | | | |
| A | 0[2] | 55 | 270 | 1.3 | 582.0 | 582.0 | 582.8 | 0.8 |
| B | 437[2] | 115 | 380 | 0.6 | 582.0 | 582.0 | 583.0 | 1.0 |
| C | 1009[2] | 165 | 508 | 0.5 | 582.0 | 582.0 | 583.0 | 1.0 |
| DONNER CREEK | | | | | | | | |
| A | 0[3] | 20 | 128 | 6.1 | 605.5 | 605.5 | 606.4 | 0.9 |
| B | 2326[3] | 84 | 295 | 3.0 | 608.9 | 608.9 | 609.7 | 0.8 |

[1] Feet above confluence with Cayuga Creek
[2] Feet above Porter Road
[3] Feet above Transit Road



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**CAYUGA CREEK WEST TRIBUTARY – CAYUGA CREEK WEST TRIBUTARY DIVERSION – DONNER CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| DONNER CREEK (CONTINUED) | | | | | | | | |
| C | 3826 | 78 | 261 | 3.4 | 612.4 | 612.4 | 612.7 | 0.3 |
| D | 4874 | 100 | 357 | 2.5 | 615.1 | 615.1 | 615.3 | 0.2 |
| E | 5786 | 72 | 471 | 1.2 | 616.7 | 616.7 | 617.3 | 0.6 |
| F | 6472 | 59 | 364 | 1.5 | 616.8 | 616.8 | 617.5 | 0.7 |
| G | 6665 | 76 | 446 | 1.3 | 616.8 | 616.8 | 617.6 | 0.8 |
| H | 6881 | 103 | 578 | 0.9 | 617.0 | 617.0 | 617.7 | 0.7 |
| I | 7217 | 76 | 399 | 1.3 | 617.1 | 617.1 | 617.8 | 0.7 |
| J | 7335 | 59 | 355 | 1.5 | 617.1 | 617.1 | 617.9 | 0.8 |
| K | 7438 | 90 | 644 | 0.8 | 617.1 | 617.1 | 617.9 | 0.8 |
| L | 7528 | 81 | 392 | 1.3 | 617.2 | 617.2 | 617.9 | 0.7 |
| M | 8029 | 80 | 324 | 1.5 | 618.0 | 618.0 | 618.9 | 0.9 |
| N | 8138 | 140 | 540 | 0.9 | 618.0 | 618.0 | 618.9 | 0.9 |
| O | 8423 | 145 | 553 | 0.9 | 618.2 | 618.2 | 619.0 | 0.8 |
| P | 8661 | 137 | 253 | 2.0 | 618.1 | 618.1 | 619.1 | 1.0 |
| Q | 8740 | 116 | 389 | 1.4 | 618.5 | 618.5 | 619.2 | 0.7 |
| R | 8873 | 123 | 844 | 0.8 | 618.6 | 618.6 | 619.3 | 0.7 |
| S | 8992 | 65 | 256 | 2.1 | 618.6 | 618.6 | 619.3 | 0.7 |
| T | 9712 | 47 | 142 | 3.7 | 619.3 | 619.3 | 620.0 | 0.7 |
| U | 10482 | 37 | 125 | 4.2 | 621.8 | 621.8 | 622.6 | 0.8 |
| V | 10676 | 77 | 183 | 2.9 | 623.0 | 623.0 | 623.8 | 0.8 |
| W | 11547 | 36 | 122 | 4.3 | 626.3 | 626.3 | 626.4 | 0.1 |
| X | 11966 | 47 | 186 | 2.8 | 628.4 | 628.4 | 628.6 | 0.2 |
| Y | 12746 | 35 | 114 | 2.6 | 630.8 | 630.8 | 631.8 | 1.0 |
| Z | 12948 | 38 | 106 | 2.8 | 631.1 | 631.1 | 632.0 | 0.9 |

[1] Feet above Transit Road



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**DONNER CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| EIGHTEENMILE CREEK | | | | | | | | |
| A | 0 | 201 | 2049 | 1.5 | 248.7 | 246.6[2] | 247.6 | 1.0 |
| B | 850 | 180 | 1411 | 8.4 | 248.7 | 247.3[2] | 248.1 | 0.8 |
| C | 1540 | 273 | 3041 | 3.9 | 248.9 | 248.9 | 249.4 | 0.5 |
| D | 1770 | 349 | 2984 | 4.0 | 249.4 | 249.0 | 249.5 | 0.5 |
| E | 2540 | 403 | 3877 | 3.0 | 249.4 | 249.4 | 249.8 | 0.4 |
| F | 3730 | 381 | 2923 | 4.0 | 249.7 | 249.7 | 250.1 | 0.4 |
| G | 4915 | 338 | 2638 | 4.5 | 250.3 | 250.3 | 250.6 | 0.3 |
| H | 6775 | 329 | 2535 | 4.7 | 251.4 | 251.4 | 251.6 | 0.2 |
| I | 8125 | 283 | 2406 | 4.9 | 252.2 | 252.2 | 252.4 | 0.2 |
| J | 9245 | 395 | 3279 | 3.5 | 252.9 | 252.9 | 253.1 | 0.2 |
| K | 9760 | 238 | 2019 | 5.7 | 253.0 | 253.0 | 253.2 | 0.2 |
| L | 9995 | 190 | 1680 | 6.9 | 253.1 | 253.1 | 253.2 | 0.1 |
| M | 10770 | 150 | 1177 | 9.8 | 253.6 | 253.6 | 253.6 | 0.0 |
| N | 10980 | 156 | 1966 | 5.9 | 255.0 | 255.0 | 256.0 | 1.0 |
| O | 11190 | 338 | 12949 | 0.9 | 302.4 | 302.4 | 302.4 | 0.0 |
| P | 11700 | 369 | 14483 | 0.8 | 302.4 | 302.4 | 302.4 | 0.0 |
| Q | 12235 | 345 | 13464 | 0.9 | 302.4 | 302.4 | 302.4 | 0.0 |
| R | 13030 | 340 | 11718 | 1.0 | 302.4 | 302.4 | 302.4 | 0.0 |
| S | 13240 | 414 | 14010 | 0.8 | 302.4 | 302.4 | 302.4 | 0.0 |
| T | 14160 | 305 | 8837 | 1.3 | 302.4 | 302.4 | 302.4 | 0.0 |
| U | 15230 | 260 | 6417 | 1.8 | 302.4 | 302.4 | 302.4 | 0.0 |
| V | 16475 | 273 | 5140 | 2.2 | 302.4 | 302.4 | 302.4 | 0.0 |
| W | 18335 | 256 | 3360 | 3.4 | 302.5 | 302.5 | 302.5 | 0.0 |
| X | 19610 | 286 | 3436 | 3.4 | 302.7 | 302.7 | 302.7 | 0.0 |
| Y | 19885 | 283 | 3589 | 3.2 | 302.8 | 302.8 | 302.8 | 0.0 |

[1] Feet above confluence with Lake Ontario
[2] Elevation computed without consideration of backwater effects from Lake Ontario



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**EIGHTEENMILE CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| EIGHTEENMILE CREEK (CONTINUED) | | | | | | | | |
| Z | 20895 | 340 | 3459 | 3.0 | 302.9 | 302.9 | 303.0 | 0.1 |
| AA | 22430 | 250 | 2511 | 4.2 | 303.2 | 303.2 | 303.2 | 0.0 |
| AB | 23075 | 215 | 1979 | 5.3 | 303.2 | 303.2 | 303.6 | 0.4 |
| AC | 23735 | 295 | 1841 | 5.7 | 304.1 | 304.1 | 304.5 | 0.4 |
| AD | 24515 | 140 | 1229 | 8.5 | 305.0 | 305.0 | 306.0 | 1.0 |
| AE | 26105 | 230 | 1454 | 7.2 | 312.1 | 312.1 | 312.7 | 0.6 |
| AF | 26775 | 132 | 1010 | 10.0 | 313.6 | 313.6 | 314.4 | 0.8 |
| AG | 26995 | 150 | 1372 | 7.4 | 317.1 | 317.1 | 317.1 | 0.0 |
| AH | 27625 | 238 | 2092 | 4.9 | 318.2 | 318.2 | 318.5 | 0.3 |
| AI | 27770 | 215 | 1475 | 6.9 | 318.2 | 318.2 | 318.5 | 0.3 |
| AJ | 27975 | 180 | 1799 | 5.6 | 330.2 | 330.2 | 330.2 | 0.0 |
| AK | 28650 | 190 | 1568 | 6.5 | 330.7 | 330.7 | 330.7 | 0.0 |
| AL | 30180 | 250 | 2452 | 4.1 | 331.6 | 331.6 | 332.2 | 0.6 |
| AM | 31450 | 270 | 2384 | 4.3 | 332.2 | 332.2 | 332.9 | 0.7 |
| AN | 32820 | 240 | 1626 | 6.2 | 333.1 | 333.1 | 334.1 | 1.0 |
| AO | 33850 | 265 | 1843 | 5.5 | 337.7 | 337.7 | 337.7 | 0.0 |
| AP | 34000 | 320 | 2428 | 4.2 | 338.2 | 338.2 | 338.2 | 0.0 |
| AQ | 34970 | 266 | 1989 | 5.1 | 338.8 | 338.8 | 339.1 | 0.3 |
| AR | 35990 | 280 | 1640 | 6.2 | 340.4 | 340.4 | 341.0 | 0.6 |
| AS | 36690 | 317 | 1999 | 5.1 | 341.4 | 341.4 | 342.0 | 0.6 |
| AT | 37260 | 377 | 2111 | 4.8 | 342.4 | 342.4 | 343.1 | 0.7 |
| AU | 38190 | 378 | 2538 | 4.0 | 343.8 | 343.8 | 344.7 | 0.9 |
| AV | 39175 | 250 | 1765 | 5.8 | 344.6 | 344.6 | 345.5 | 0.9 |
| AW | 40170 | 370 | 2813 | 3.3 | 346.4 | 346.4 | 347.0 | 0.6 |

[1] Feet above confluence with Lake Ontario



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**EIGHTEENMILE CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| EIGHTEENMILE CREEK (CONTINUED) | | | | | | | | |
| AX | 40950 | 162 | 1144 | 8.1 | 346.4 | 346.4 | 347.0 | 0.6 |
| AY | 41060 | 200 | 1918 | 4.8 | 348.9 | 348.9 | 349.4 | 0.5 |
| AZ | 41500 | 285 | 2623 | 3.5 | 349.7 | 349.7 | 350.0 | 0.3 |
| BA | 42960 | 350 | 2575 | 3.6 | 350.4 | 350.4 | 350.8 | 0.4 |
| BB | 44045 | 350 | 3199 | 2.9 | 351.0 | 351.0 | 351.6 | 0.6 |
| BC | 44910 | 344 | 2877 | 3.2 | 351.2 | 351.2 | 351.9 | 0.7 |
| BD | 46530 | 442 | 3857 | 2.4 | 352.0 | 352.0 | 352.7 | 0.7 |
| BE | 47545 | 310 | 2521 | 3.7 | 352.0 | 352.0 | 353.0 | 1.0 |
| BF | 48350 | 301 | 3232 | 2.9 | 352.8 | 352.8 | 353.5 | 0.7 |
| BG | 49320 | 450 | 4306 | 2.1 | 353.2 | 353.2 | 354.0 | 0.8 |
| BH | 50040 | 360 | 3813 | 2.4 | 353.3 | 353.3 | 354.1 | 0.8 |
| BI | 51430 | 460 | 4943 | 1.9 | 353.6 | 353.6 | 354.4 | 0.8 |
| BJ | 52060 | 330 | 2442 | 1.3 | 353.7 | 353.7 | 354.6 | 0.9 |
| BK | 53400 | 250 | 1915 | 1.6 | 353.9 | 353.9 | 354.8 | 0.9 |
| BL | 53600 | 260 | 2040 | 1.5 | 354.1 | 354.1 | 354.9 | 0.8 |
| BM | 54560 | 303 | 2159 | 1.5 | 354.3 | 354.3 | 355.1 | 0.8 |
| BN | 55410 | 140 | 1162 | 2.7 | 354.3 | 354.3 | 355.1 | 0.8 |
| BO | 56330 | 150 | 1145 | 2.7 | 354.9 | 354.9 | 355.9 | 1.0 |
| BP | 57065 | 151 | 1281 | 2.5 | 355.2 | 355.2 | 356.1 | 0.9 |
| BQ | 57900 | 350 | 3097 | 1.0 | 357.8 | 357.8 | 358.8 | 1.0 |
| BR | 59250 | 175 | 1445 | 2.1 | 357.8 | 357.8 | 358.7 | 0.9 |
| BS | 60550 | 300 | 2010 | 1.5 | 358.0 | 358.0 | 359.0 | 1.0 |
| BT | 62150 | 400 | 2575 | 1.2 | 358.4 | 358.4 | 359.3 | 0.9 |
| BU | 63800 | 200 | 1374 | 2.2 | 359.8 | 359.8 | 360.5 | 0.7 |

[1] Feet above confluence with Lake Ontario



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**EIGHTEENMILE CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| EIGHTEENMILE CREEK (CONTINUED) | | | | | | | | |
| BV | 65050 | 150 | 601 | 5.1 | 360.1 | 360.1 | 361.1 | 1.0 |
| BW | 66250 | 140 | 587 | 3.4 | 362.3 | 362.3 | 362.7 | 0.4 |
| BX | 68300 | 160 | 1013 | 2.0 | 363.9 | 363.9 | 364.4 | 0.5 |
| BY | 70235 | 78 | 338 | 5.9 | 364.1 | 364.1 | 364.1 | 0.0 |
| BZ | 71085 | 90 | 567 | 3.5 | 364.1 | 364.1 | 364.1 | 0.0 |
| CA | 71725 | 71 | 476 | 2.4 | 364.1 | 364.1 | 364.1 | 0.0 |
| CB | 72245 | 43 | 187 | 6.1 | 364.1 | 364.1 | 364.1 | 0.0 |
| CC | 69386 | 190 | 1452 | 1.4 | 364.1 | 364.1 | 364.8 | 0.7 |
| CD | 72695 | 37 | 114 | 10.0 | 366.9 | 366.9 | 366.9 | 0.0 |
| CE | 72835 | 36 | 113 | 10.1 | 368.8 | 368.8 | 368.8 | 0.0 |
| CF | 73395 | 26 | 102 | 11.2 | 381.9 | 381.9 | 382.1 | 0.2 |
| CG | 73995 | 38 | 115 | 9.9 | 410.5 | 410.5 | 410.5 | 0.0 |
| CH | 74075 | 16 | 86 | 13.2 | 417.4 | 417.4 | 417.4 | 0.0 |
| CI | 74357 | 41 | 117 | 9.7 | 428.7 | 428.7 | 428.7 | 0.0 |
| CJ | 74482 | 30 | 138 | 8.3 | 431.4 | 431.4 | 431.4 | 0.0 |
| CK | 74642 | 40 | 135 | 8.5 | 436.7 | 436.7 | 436.7 | 0.0 |
| CL | 74762 | 55 | 335 | 3.4 | 451.4 | 451.4 | 451.5 | 0.1 |
| CM | 74797 | 52 | 330 | 3.5 | 451.4 | 451.4 | 451.5 | 0.1 |
| CN | 74897 | 65 | 377 | 3.0 | 451.5 | 451.5 | 451.6 | 0.1 |
| CO | 75747 | 28 | 103 | 11.0 | 456.9 | 456.9 | 457.0 | 0.1 |
| CP | 76467 | 140 | 279 | 4.1 | 460.3 | 460.3 | 460.9 | 0.6 |
| CQ | 76667 | 145 | 179 | 6.4 | 467.0 | 467.0 | 467.0 | 0.0 |
| CR | 77067 | 41 | 117 | 9.7 | 470.1 | 470.1 | 470.1 | 0.0 |
| CS | 77312 | 50 | 250 | 4.6 | 472.3 | 472.3 | 473.0 | 0.7 |

[1] Feet above confluence with Lake Ontario



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**EIGHTEENMILE CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| EIGHTEENMILE CREEK (CONTINUED) | | | | | | | | |
| CT | 77412[1] | 68 | 284 | 4.0 | 473.9 | 473.9 | 474.1 | 0.2 |
| CU | 77592[1] | 70 | 342 | 3.3 | 474.1 | 474.1 | 474.3 | 0.2 |
| CB | 77715[1] | 75 | 639 | 1.8 | 484.5 | 484.5 | 484.5 | 0.0 |
| CW | 78110[1] | 47 | 194 | 5.9 | 484.5 | 484.5 | 484.5 | 0.0 |
| CX | 78210[1] | 56 | 231 | 4.9 | 484.5 | 484.5 | 484.5 | 0.0 |
| CY | 78730[1] | 38 | 117 | 8.5 | 485.4 | 485.4 | 485.5 | 0.1 |
| CZ | 82910[1] | 36 | 102 | 9.7 | 616.0 | 616.0 | 616.0 | 0.0 |
| DA | 83800[1] | 71 | 291 | 3.4 | 618.0 | 618.0 | 618.9 | 0.9 |
| DB | 84640[1] | 110 | 406 | 2.4 | 618.5 | 618.5 | 619.5 | 1.0 |
| DC | 85720[1] | 37 | 160 | 6.3 | 620.3 | 620.3 | 620.5 | 0.2 |
| DD | 85880[1] | 50 | 273 | 3.6 | 621.1 | 621.1 | 621.1 | 0.0 |
| DE | 86130[1] | 70 | 401 | 1.5 | 621.1 | 621.1 | 621.5 | 0.4 |
| EIGHTEENMILE CREEK EAST TRIBUTARY | | | | | | | | |
| A | 750[2] | 170 | 937 | 0.4 | 359.7 | 359.7 | 360.4 | 0.7 |
| B | 2250[2] | 83 | 138 | 1.7 | 359.7 | 359.7 | 360.4 | 0.7 |
| C | 4115[2] | 130 | 282 | 0.8 | 362.3 | 362.3 | 363.1 | 0.8 |
| D | 5270[2] | 130 | 158 | 1.5 | 362.8 | 362.8 | 363.5 | 0.7 |
| EIGHTEENMILE CREEK WEST TRIBUTARY | | | | | | | | |
| A | 795[3] | 400 | 2190 | 0.8 | 358.6 | 358.6 | 359.6 | 1.0 |
| B | 2170[3] | 230 | 1036 | 1.8 | 359.1 | 359.1 | 360.9 | 1.8 |

[1] Feet above confluence with Lake Ontario
[2] Feet above State Route 104 - Ridge Road
[3] Feet above confluence with Eighteenmile Creek



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**EIGHTEENMILE CREEK – EIGHTEENMILE CREEK EAST TRIBUTARY – EIGHTEENMILE CREEK WEST TRIBUTARY**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| EIGHTEENMILE CREEK WEST TRIBUTARY (CONTINUED) | | | | | | | | |
| C | 3350 | 125 | 922 | 2.0 | 359.5 | 359.5 | 360.4 | 0.9 |
| D | 5800 | 277 | 2192 | 0.8 | 376.8 | 376.8 | 376.9 | 0.1 |
| E | 6860 | 166 | 986 | 1.7 | 377.0 | 377.0 | 377.1 | 0.1 |
| F | 8500 | 164 | 941 | 1.8 | 377.4 | 377.4 | 377.5 | 0.1 |
| G | 9380 | 104 | 317 | 5.4 | 377.6 | 377.6 | 377.6 | 0.0 |
| H | 12480 | 200 | 559 | 2.5 | 380.8 | 380.8 | 381.7 | 0.9 |
| EIGHTEENMILE CREEK. EAST BRANCH | | | | | | | | |
| A | 630 | 220 | 2225 | 3.0 | 353.7 | 353.7 | 354.7 | 1.0 |
| B | 1430 | 240 | 1965 | 3.4 | 353.9 | 353.9 | 354.9 | 1.0 |
| C | 1632 | 240 | 1868 | 3.6 | 354.0 | 354.0 | 355.0 | 1.0 |
| D | 2387 | 216 | 1847 | 3.7 | 354.5 | 354.5 | 355.4 | 0.9 |
| E | 3527 | 190 | 1783 | 3.8 | 355.4 | 355.4 | 356.1 | 0.7 |
| F | 3777 | 190 | 1536 | 4.4 | 355.9 | 355.9 | 356.2 | 0.3 |
| G | 4477 | 180 | 1309 | 5.2 | 356.2 | 356.2 | 356.7 | 0.5 |
| H | 5202 | 150 | 1209 | 5.6 | 357.0 | 357.0 | 357.9 | 0.9 |
| I | 6870 | 383 | 2946 | 2.3 | 361.1 | 361.1 | 361.7 | 0.6 |
| J | 8650 | 362 | 4611 | 2.6 | 361.7 | 361.7 | 362.4 | 0.7 |
| K | 10150 | 339 | 2423 | 2.7 | 362.1 | 362.1 | 363.0 | 0.9 |
| L | 11775 | 250 | 1716 | 3.9 | 362.9 | 362.9 | 363.7 | 0.8 |
| M | 12750 | 575 | 3350 | 2.0 | 364.4 | 364.4 | 365.2 | 0.8 |
| N | 14150 | 245 | 1652 | 4.0 | 365.1 | 365.1 | 366.0 | 0.9 |

[1] Feet above confluence with Eighteenmile Creek



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**EIGHTEENMILE CREEK WEST TRIBUTARY – EIGHTEENMILE CREEK, EAST BRANCH**

| FLOODING SOURCE | | FLOODWAY | | | 1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| EIGHTEENMILE CREEK, EAST BRANCH (CONTINUED) | | | | | | | | |
| O | 15150[1] | 536 | 3939 | 1.7 | 366.6 | 366.6 | 367.3 | 0.7 |
| P | 16470[1] | 269 | 1962 | 3.4 | 367.2 | 367.2 | 367.8 | 0.6 |
| Q | 17250[1] | 163 | 1347 | 4.9 | 367.6 | 367.6 | 368.4 | 0.8 |
| R | 19475[1] | 248 | 2332 | 2.7 | 369.6 | 369.6 | 370.4 | 0.8 |
| S | 21655[1] | 315 | 1554 | 2.5 | 370.2 | 370.2 | 371.0 | 0.8 |
| T | 23250[1] | 378 | 3141 | 2.0 | 371.8 | 371.8 | 372.6 | 0.8 |
| U | 24150[1] | 457 | 3740 | 1.7 | 372.1 | 372.1 | 372.9 | 0.8 |
| V | 26190[1] | 300 | 2829 | 2.2 | 373.2 | 373.2 | 373.9 | 0.7 |
| W | 27715[1] | 413 | 4095 | 1.5 | 373.8 | 373.8 | 374.6 | 0.8 |
| X | 29305[1] | 375 | 3713 | 1.7 | 374.1 | 374.1 | 374.9 | 0.8 |
| Y | 30450[1] | 850 | 7988 | 0.8 | 374.1 | 374.1 | 374.9 | 0.8 |
| Z | 31170[1] | 300 | 2714 | 2.3 | 374.1 | 374.1 | 374.9 | 0.8 |
| AA | 31400[1] | 395 | 4287 | 1.4 | 376.3 | 376.3 | 377.1 | 0.8 |
| AB | 36200[1] | 445 | 4065 | 1.5 | 376.7 | 376.7 | 377.5 | 0.8 |
| AC | 38790[1] | 220 | 2550 | 2.4 | 377.0 | 377.0 | 377.8 | 0.8 |
| ERIE CANAL | | | | | | | | |
| A | 670[2] | 204 | 4021 | 0.2 | 579.2 | 575.8[3] | 576.8 | 1.0 |
| B | 2040[2] | 242 | 4606 | 0.2 | 579.2 | 575.8[3] | 576.8 | 1.0 |
| C | 3520[2] | 223 | 4462 | 0.2 | 579.2 | 575.8[3] | 576.8 | 1.0 |
| D | 3630[2] | 235 | 4939 | 0.1 | 579.2 | 575.8[3] | 576.8 | 1.0 |
| E | 4575[2] | 231 | 4267 | 0.2 | 579.2 | 575.8[3] | 576.8 | 1.0 |
| F | 5870[2] | 207 | 3503 | 0.2 | 579.2 | 575.8[3] | 576.8 | 1.0 |

[1] Feet above confluence with Eighteenmile Creek

[2] Feet above confluence with Tonawanda Creek

[3] Elevation computed without consideration of backwater effects of Tonawanda Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

# NIAGARA COUNTY, NEW YORK
## (ALL JURISDICTIONS)

# FLOODWAY DATA

# EIGHTEENMILE CREEK, EAST BRANCH - ERIE CANAL

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| FISH CREEK 1 | | | | | | | | |
| A | 570 | 15 | 96 | 10.2 | 559.7 | 559.7 | 559.7 | 0.0 |
| B | 650 | 34 | 125 | 7.9 | 561.5 | 561.5 | 561.5 | 0.0 |
| C | 730 | 32 | 125 | 7.9 | 563.0 | 563.0 | 563.0 | 0.0 |
| D | 880 | 33 | 132 | 7.4 | 566.6 | 566.6 | 566.6 | 0.0 |
| E | 1000 | 37 | 145 | 6.7 | 566.7 | 566.7 | 566.7 | 0.0 |
| F | 1150 | 32 | 168 | 5.9 | 570.3 | 570.3 | 570.3 | 0.0 |
| G | 1550 | 30 | 130 | 7.5 | 571.7 | 571.7 | 571.7 | 0.0 |
| H | 1680 | 39 | 223 | 4.4 | 574.2 | 574.2 | 574.2 | 0.0 |
| I | 1980 | 32 | 126 | 7.8 | 574.2 | 574.2 | 574.3 | 0.1 |
| J | 2140 | 32 | 293 | 3.3 | 579.1 | 579.1 | 579.1 | 0.0 |
| K | 2200 | 38 | 249 | 3.9 | 579.1 | 579.1 | 579.1 | 0.0 |
| L | 2360 | 43 | 288 | 3.4 | 581.1 | 581.1 | 581.1 | 0.0 |
| M | 2420 | 41 | 300 | 3.3 | 581.2 | 581.2 | 581.2 | 0.0 |
| N | 2550 | 40 | 356 | 2.8 | 581.9 | 581.9 | 582.0 | 0.1 |
| O | 2950 | 40 | 211 | 4.7 | 582.0 | 582.0 | 582.2 | 0.2 |
| P | 3550 | 37 | 128 | 7.6 | 585.9 | 585.9 | 585.9 | 0.0 |
| Q | 4250 | 30 | 122 | 8.0 | 590.8 | 590.8 | 590.8 | 0.0 |
| R | 4380 | 26 | 190 | 5.2 | 592.0 | 592.0 | 592.0 | 0.0 |
| S | 4880 | 35 | 299 | 3.3 | 592.1 | 592.1 | 592.5 | 0.4 |
| T | 4950 | 41 | 324 | 3.0 | 592.2 | 592.2 | 592.5 | 0.3 |
| U | 5150 | 44 | 328 | 3.0 | 592.2 | 592.2 | 592.6 | 0.4 |
| V | 5210 | 52 | 375 | 2.6 | 592.2 | 592.2 | 592.6 | 0.4 |
| W | 5370 | 45 | 331 | 3.0 | 592.2 | 592.2 | 592.6 | 0.4 |
| X | 5720 | 43 | 257 | 3.8 | 592.2 | 592.2 | 592.7 | 0.5 |
| Y | 5860 | 50 | 356 | 2.8 | 592.3 | 592.3 | 593.1 | 0.8 |

[1] Feet above mouth



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**FISH CREEK 1**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| FISH CREEK 1 (CONTINUED) | | | | | | | | |
| Z | 6060[1] | 72 | 453 | 2.2 | 592.4 | 592.4 | 593.3 | 0.9 |
| AA | 6200[1] | 130 | 672 | 1.5 | 592.4 | 592.4 | 593.4 | 1.0 |
| AB | 7000[1] | 160 | 565 | 1.7 | 592.8 | 592.8 | 593.8 | 1.0 |
| AC | 7550[1] | 170 | 591 | 1.7 | 593.5 | 593.5 | 594.4 | 0.9 |
| AD | 8150[1] | 140 | 250 | 3.9 | 594.9 | 594.9 | 595.0 | 0.1 |
| AE | 8550[1] | 143 | 428 | 2.3 | 595.9 | 595.9 | 596.6 | 0.7 |
| AF | 8690[1] | 120 | 592 | 1.7 | 598.8 | 598.8 | 598.8 | 0.0 |
| AG | 9390[1] | 138 | 742 | 1.3 | 598.8 | 598.8 | 598.9 | 0.1 |
| FISH CREEK 2 | | | | | | | | |
| A | 40[2] | 65 | 317 | 8.2 | 249.8 | 249.8 | 250.8 | 1.0 |
| B | 250[2] | 93 | 574 | 4.5 | 251.4 | 251.4 | 252.1 | 0.7 |
| C | 865[2] | 77 | 439 | 5.9 | 252.1 | 252.1 | 253.0 | 0.9 |
| D | 1625[2] | 42 | 205 | 12.7 | 257.8 | 257.8 | 258.0 | 0.2 |
| E | 1825[2] | 68 | 675 | 3.8 | 264.1 | 264.1 | 264.9 | 0.8 |
| GILL CREEK | | | | | | | | |
| A | 4[3] | 111 | 1340 | 0.5 | 561.2 | 561.2 | 561.2 | 0.0 |
| B | 803[3] | 57 | 686 | 1.1 | 566.2 | 566.2 | 566.2 | 0.0 |
| C | 3358[3] | 137 | 544 | 1.3 | 570.0 | 570.0 | 570.0 | 0.0 |
| D | 3752[3] | 307 | 174 | 4.2 | 570.3 | 570.3 | 570.8 | 0.5 |
| E | 4559[3] | 129 | 247 | 3.0 | 570.9 | 570.9 | 571.5 | 0.6 |
| F | 5711[3] | 54 | 588 | 1.2 | 571.7 | 571.7 | 572.2 | 0.5 |
| G | 6018[3] | 60 | 709 | 1.0 | 572.2 | 572.2 | 572.6 | 0.4 |

[1] Feet above mouth
[2] Feet above confluence with Lake Ontario
[3] Feet above confluence with Niagara River



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK (ALL JURISDICTIONS)**

**FLOODWAY DATA**

**FISH CREEK 1 – FISH CREEK 2 – GILL CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| GILL CREEK (CONTINUED) | | | | | | | | |
| H | 6649 | 90 | 460 | 1.6 | 573.2 | 573.2 | 573.6 | 0.4 |
| I | 7908 | 483 | 774 | 0.9 | 576.9 | 576.9 | 577.6 | 0.7 |
| J | 8632 | 310 | 1483 | 0.5 | 576.9 | 576.9 | 577.6 | 0.7 |
| K | 9649 | 371 | 2446 | 0.3 | 576.9 | 576.9 | 577.7 | 0.8 |
| L | 11061 | 286 | 2006 | 0.4 | 576.9 | 576.9 | 577.7 | 0.8 |
| M | 12961 | 119 | 3404 | 0.2 | 577.8 | 577.8 | 578.3 | 0.5 |
| N | 13655 | 73 | 563 | 2.4 | 577.8 | 577.8 | 578.4 | 0.6 |
| O | 14221 | 150 | 391 | 3.5 | 577.9 | 577.9 | 578.5 | 0.6 |
| P | 15813 | 140 | 322 | 4.2 | 578.3 | 578.3 | 578.9 | 0.6 |
| O | 16762 | 48 | 559 | 2.7 | 578.8 | 578.8 | 578.4 | 0.6 |
| R | 17346 | 32 | 1006 | 1.4 | 579.1 | 579.1 | 579.6 | 0.5 |
| S | 18414 | 100 | 632 | 2.2 | 583.9 | 583.9 | 583.9 | 0.0 |
| T | 19382 | 300 | 230 | 6.1 | 584.8 | 584.8 | 584.8 | 0.0 |
| U | 19565 | 142 | 733 | 1.1 | 585.0 | 585.0 | 585.7 | 0.7 |
| V | 19915 | 100 | 454 | 1.8 | 585.1 | 585.1 | 585.8 | 0.7 |
| W | 20615 | 33 | 149 | 5.6 | 585.1 | 585.1 | 586.1 | 1.0 |
| X | 21225 | 113 | 889 | 0.9 | 589.0 | 589.0 | 590.0 | 1.0 |
| Y | 21615 | 134 | 870 | 1.0 | 589.0 | 589.0 | 590.0 | 1.0 |
| Z | 22115 | 55 | 312 | 2.7 | 590.3 | 590.3 | 591.3 | 1.0 |
| AA | 22395 | 153 | 1027 | 0.8 | 590.5 | 590.5 | 591.5 | 1.0 |
| AB | 23165 | 51 | 233 | 3.6 | 590.6 | 590.6 | 591.6 | 1.0 |
| AC | 24275 | 55 | 322 | 1.8 | 592.7 | 592.7 | 593.2 | 0.5 |
| AD | 24965 | 45 | 362 | 1.6 | 598.0 | 598.0 | 599.0 | 1.0 |
| AE | 25275 | 38 | 265 | 2.2 | 598.0 | 598.0 | 599.0 | 1.0 |
| AF | 26525 | 80 | 355 | 2.5 | 598.0 | 598.0 | 598.4 | 0.4 |
| AG | 27325 | 65 | 152 | 5.9 | 599.9 | 599.9 | 600.6 | 0.7 |

[1] Feet above confluence with Niagara River



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**GILL CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| GILL CREEK (CONTINUED) | | | | | | | | |
| AH | 27475[1] | 80 | 384 | 2.3 | 602.8 | 602.8 | 603.7 | 0.9 |
| AI | 27565[1] | 80 | 479 | 1.9 | 603.0 | 603.0 | 603.9 | 0.9 |
| AJ | 28015[1] | 79 | 347 | 2.0 | 603.2 | 603.2 | 604.2 | 1.0 |
| AK | 28615[1] | 80 | 394 | 1.8 | 604.2 | 604.2 | 604.9 | 0.7 |
| AL | 28915[1] | 80 | 311 | 2.3 | 604.4 | 604.4 | 605.2 | 0.8 |
| AM | 30855[1] | 91 | 244 | 2.9 | 608.5 | 608.5 | 608.8 | 0.3 |
| AN | 31855[1] | 111 | 360 | 2.0 | 610.0 | 610.0 | 610.7 | 0.7 |
| AO | 32185[1] | 112 | 376 | 1.9 | 610.1 | 610.1 | 611.1 | 1.0 |
| AP | 33315[1] | 38 | 146 | 4.9 | 613.4 | 613.4 | 613.4 | 0.0 |
| AQ | 34385[1] | 40 | 187 | 3.8 | 617.1 | 617.1 | 617.1 | 0.0 |
| AR | 35415[1] | 34 | 168 | 4.2 | 619.4 | 619.4 | 619.4 | 0.0 |
| AS | 36815[1] | 46 | 270 | 2.6 | 622.0 | 622.0 | 622.0 | 0.0 |
| AT | 37665[1] | 36 | 252 | 2.8 | 622.8 | 622.8 | 622.8 | 0.0 |
| AU | 37815[1] | 36 | 257 | 2.8 | 622.9 | 622.9 | 622.9 | 0.0 |
| GILL CREEK EAST TRIBUTARY | | | | | | | | |
| A | 630[2] | 46 | 249 | 1.3 | 596.8 | 596.8 | 597.8 | 1.0 |
| B | 1126[2] | 45 | 270 | 1.2 | 597.7 | 597.7 | 598.6 | 0.9 |
| C | 1700[2] | 46 | 216 | 1.5 | 597.8 | 597.8 | 598.7 | 0.9 |
| D | 1960[2] | 29 | 155 | 2.1 | 598.7 | 598.7 | 599.5 | 0.8 |
| E | 2220[2] | 80 | 295 | 1.1 | 598.8 | 598.8 | 599.7 | 0.9 |
| F | 2490[2] | 103 | 518 | 0.6 | 600.4 | 600.4 | 601.4 | 1.0 |
| G | 2890[2] | 97 | 233 | 1.4 | 600.4 | 600.4 | 601.4 | 1.0 |

[1] Feet above confluence with Niagara River
[2] Feet above Town of Niagara corporate limits



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**GILL CREEK – GILL CREEK EAST TRIBUTARY**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| GOLDEN HILL CREEK | | | | | | | | |
| A | 1151 | 116 | 909 | 4.1 | 265.8 | 265.8 | 266.8 | 1.0 |
| B | 2555 | 106 | 649 | 5.8 | 267.8 | 267.8 | 268.7 | 0.9 |
| C | 2658 | 82 | 619 | 6.1 | 270.3 | 270.3 | 270.3 | 0.0 |
| D | 3718 | 100 | 646 | 5.8 | 270.9 | 270.9 | 271.7 | 0.8 |
| E | 4638 | 55 | 515 | 7.3 | 272.3 | 272.3 | 273.2 | 0.9 |
| F | 4795 | 67 | 726 | 5.2 | 275.7 | 275.7 | 275.7 | 0.0 |
| G | 6045 | 100 | 979 | 3.3 | 276.1 | 276.1 | 276.7 | 0.6 |
| H | 6625 | 100 | 589 | 5.4 | 276.1 | 276.1 | 276.7 | 0.6 |
| I | 6795 | 100 | 820 | 3.9 | 278.6 | 278.6 | 278.8 | 0.2 |
| J | 7590 | 150 | 617 | 5.2 | 279.2 | 279.2 | 279.6 | 0.4 |
| K | 8635 | 210 | 639 | 5.0 | 283.2 | 283.2 | 284.0 | 0.8 |
| L | 9250 | 100 | 699 | 6.4 | 287.0 | 287.0 | 287.0 | 0.0 |
| M | 10015 | 100 | 584 | 5.5 | 289.0 | 289.0 | 289.7 | 0.7 |
| N | 10900 | 109 | 555 | 5.8 | 292.1 | 292.1 | 292.4 | 0.3 |
| O | 11955 | 100 | 504 | 6.3 | 296.8 | 296.8 | 297.3 | 0.5 |
| P | 12415 | 81 | 586 | 5.4 | 298.3 | 298.3 | 299.1 | 0.8 |
| Q | 12545 | 108 | 662 | 4.8 | 300.1 | 300.1 | 300.5 | 0.4 |
| R | 13825 | 92 | 423 | 7.5 | 302.8 | 302.8 | 302.8 | 0.0 |
| S | 14675 | 100 | 453 | 7.0 | 306.2 | 306.2 | 306.3 | 0.1 |
| T | 15475 | 100 | 639 | 5.0 | 308.2 | 308.2 | 309.1 | 0.9 |
| U | 16975 | 99 | 296 | 10.8 | 315.3 | 315.3 | 315.3 | 0.0 |
| V | 17120 | 100 | 902 | 3.5 | 317.4 | 317.4 | 317.9 | 0.5 |
| W | 18020 | 115 | 866 | 3.3 | 317.8 | 317.8 | 318.3 | 0.5 |
| X | 19060 | 140 | 1191 | 2.4 | 318.2 | 318.2 | 318.8 | 0.6 |
| Y | 20875 | 140 | 1233 | 2.3 | 318.6 | 318.6 | 319.2 | 0.6 |

[1] Feet above Golden Hill State Park Bridge



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**GOLDEN HILL CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| GOLDEN HILL CREEK (CONTINUED) | | | | | | | | |
| Z | 22290 | 130 | 902 | 3.2 | 319.0 | 319.0 | 319.6 | 0.6 |
| AA | 23675 | 120 | 799 | 3.6 | 320.2 | 320.2 | 320.8 | 0.6 |
| AB | 24815 | 120 | 741 | 3.8 | 321.7 | 321.7 | 322.1 | 0.4 |
| AC | 24955 | 120 | 768 | 3.7 | 323.9 | 323.9 | 323.9 | 0.0 |
| AD | 26405 | 160 | 1262 | 2.3 | 324.4 | 324.4 | 324.8 | 0.4 |
| AE | 27725 | 200 | 1377 | 2.1 | 324.6 | 324.6 | 325.4 | 0.8 |
| AF | 27880 | 240 | 2024 | 1.4 | 324.7 | 324.7 | 325.6 | 0.9 |
| AG | 28795 | 280 | 1891 | 1.5 | 324.8 | 324.8 | 325.7 | 0.9 |
| AH | 29840 | 280 | 1873 | 1.2 | 324.9 | 324.9 | 325.8 | 0.9 |
| AI | 30870 | 300 | 1681 | 1.2 | 325.1 | 325.1 | 326.0 | 0.9 |
| AJ | 31820 | 300 | 1656 | 1.2 | 325.2 | 325.2 | 326.2 | 1.0 |
| AK | 33265 | 240 | 1030 | 1.9. | 325.5 | 325.5 | 326.4 | 0.9 |
| AL | 33460 | 120 | 527 | 3.8 | 328.8 | 328.8 | 328.8 | 0.0 |
| AM | 33577 | 120 | 510 | 3.9 | 329.0 | 329.0 | 329.0 | 0.0 |
| AN | 34480 | 120 | 649 | 3.1 | 329.3 | 329.3 | 329.7 | 0.4 |
| AO | 35980 | 120 | 696 | 2.8 | 330.1 | 330.1 | 331.1 | 1.0 |
| AP | 36080 | 160 | 585 | 3.4 | 331.2 | 331.2 | 331.3 | 0.1 |
| AQ | 36180 | 200 | 984 | 2.0 | 331.6 | 331.6 | 331.7 | 0.1 |
| AR | 38120 | 370 | 826 | 2.2 | 332.4 | 332.4 | 333.4 | 1.0 |
| AS | 39070 | 140 | 398 | 4.5 | 336.2 | 336.2 | 336.2 | 0.0 |
| AT | 39230 | 100 | 540 | 3.3 | 338.3 | 338.3 | 338.3 | 0.0 |
| AU | 39390 | 100 | 582 | 3.1 | 338.4 | 338.4 | 338.4 | 0.0 |
| AV | 39940 | 200 | 835 | 2.2 | 338.4 | 338.4 | 338.6 | 0.2 |
| AW | 40080 | 200 | 636 | 2.8 | 339.2 | 339.2 | 339.2 | 0.0 |

[1] Feet above Golden Hill State Park Bridge



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**GOLDEN HILL CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| GOLDEN HILL CREEK (CONTINUED) | | | | | | | | |
| AX | 40140[1] | 240 | 794 | 2.3 | 339.2 | 339.2 | 339.2 | 0.0 |
| AY | 41730[1] | 320 | 665 | 2.7 | 340.4 | 340.4 | 341.2 | 0.8 |
| AZ | 42730[1] | 110 | 367 | 4.9 | 343.4 | 343.4 | 343.4 | 0.0 |
| BA | 44070[1] | 110 | 430 | 4.2 | 345.8 | 345.8 | 346.8 | 1.0 |
| BB | 45190[1] | 170 | 718 | 2.0 | 347.2 | 347.2 | 348.0 | 0.8 |
| BC | 46180[1] | 200 | 936 | 1.5 | 347.6 | 347.6 | 348.4 | 0.8 |
| BD | 48360[1] | 240 | 726 | 2.0 | 348.5 | 348.5 | 349.3 | 0.8 |
| BE | 49750[1] | 150 | 383 | 4.8 | 352.6 | 352.6 | 352.6 | 0.0 |
| GULF BRANCH | | | | | | | | |
| A | 100[2] | 200 | 387 | 2.5 | 362.6 | 362.6 | 363.0 | 0.4 |
| B | 495[2] | 54 | 225 | 4.3 | 362.7 | 362.7 | 363.4 | 0.7 |
| C | 940[2] | 64 | 186 | 5.2 | 363.5 | 363.5 | 364.0 | 0.5 |
| D | 1320[2] | 71 | 118 | 8.1 | 365.5 | 365.5 | 366.4 | 0.9 |
| E | 1840[2] | 48 | 110 | 8.7 | 372.8 | 372.8 | 372.8 | 0.0 |
| F | 1945[2] | 50 | 117 | 8.2 | 375.0 | 375.0 | 375.0 | 0.0 |
| G | 3095[2] | 50 | 117 | 8.2 | 415.1 | 415.1 | 415.1 | 0.0 |
| H | 4400[2] | 50 | 117 | 8.2 | 438.0 | 438.0 | 438.0 | 0.0 |
| I | 5820[2] | 50 | 147 | 6.5 | 456.5 | 456.5 | 456.5 | 0.0 |
| J | 6885[2] | 50 | 140 | 6.9 | 466.8 | 466.8 | 466.8 | 0.0 |
| K | 7800[2] | 234 | 1460 | 0.6 | 480.0 | 480.0 | 480.0 | 0.0 |
| L | 9510[2] | 84 | 119 | 6.8 | 508.7 | 508.7 | 508.7 | 0.0 |
| M | 10650[2] | 53 | 101 | 8.0 | 539.9 | 539.9 | 539.9 | 0.0 |

[1] Feet above Golden Hill State Park Bridge
[2] Feet above confluence with Eighteenmile Creek



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**GOLDEN HILL CREEK – GULF BRANCH**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| GULF TRIBUTARY | | | | | | | | |
| A | 750[1] | 106 | 58 | 3.7 | 508.8 | 508.8 | 509.3 | 0.5 |
| B | 2015[1] | 53 | 42 | 5.1 | 511.1 | 511.1 | 511.1 | 0.0 |
| HOPKINS CREEK | | | | | | | | |
| A | 80[2] | 300 | 1683 | 1.7 | 248.7 | 246.6[5] | 247.6 | 1.0 |
| B | 1400[2] | 196 | 868 | 3.3 | 248.7 | 247.0[5] | 247.8 | 0.8 |
| C | 1600[2] | 285 | 1211 | 1.7 | 248.7 | 247.4[5] | 248.1 | 0.7 |
| D | 2320[2] | 131 | 254 | 8.0 | 248.9 | 248.9 | 248.9 | 0.0 |
| E | 2990[2] | 41 | 207 | 9.8 | 253.8 | 253.8 | 253.8 | 0.0 |
| F | 3190[2] | 27 | 286 | 7.1 | 259.6 | 259.6 | 259.6 | 0.0 |
| G | 3740[2] | 60 | 622 | 3.3 | 259.8 | 259.8 | 259.9 | 0.1 |
| H | 4310[2] | 60 | 360 | 5.6 | 259.8 | 259.8 | 260.2 | 0.4 |
| I | 4780[2] | 60 | 240 | 8.5 | 262.0 | 262.0 | 262.0 | 0.0 |
| J | 4980[2] | 60 | 1177 | 1.7 | 278.6 | 278.6 | 278.6 | 0.0 |
| JOHNSON CREEK 2 | | | | | | | | |
| A | 21850[3] | 29 | 135 | 12.3 | 486.2 | 486.2 | 486.2 | 0.0 |
| B | 23250[3] | 88 | 504 | 3.2 | 511.9 | 511.9 | 511.9 | 0.0 |
| C | 25000[3] | 121 | 707 | 2.1 | 521.3 | 521.3 | 522.2 | 0.9 |
| D | 27000[3] | 135 | 608 | 2.4 | 540.8 | 540.8 | 541.8 | 1.0 |
| JOHNSON CREEK 2 TRIBUTARY 1 | | | | | | | | |
| A | 1500[4] | 61 | 217 | 1.8 | 525.7 | 525.7 | 526.6 | 0.9 |

[1] Feet above confluence with Gulf Branch
[2] Feet above confluence with Lake Ontario
[3] Feet above confluence with Jeddo Creek
[4] Feet above confluence with Johnson Creek 2
[5] Elevation computed without consideration of backwater effects of Lake Ontario



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**GULF TRIBUTARY – HOPKINS CREEK – JOHNSON CREEK 2 – JOHNSON CREEK 2 TRIBUTARY 1**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| KEG CREEK | | | | | | | | |
| A | 0[1] | 441 | 1016 | 2.5 | 248.5 | 246.6[3] | 247.6 | 1.0 |
| B | 90[1] | 465 | 1999 | 1.3 | 249.8 | 249.8 | 249.8 | 0.0 |
| C | 790[1] | 193 | 553 | 4.6 | 249.8 | 249.8 | 249.8 | 0.0 |
| D | 1490[1] | 121 | 422 | 6.1 | 251.4 | 251.4 | 251.5 | 0.1 |
| E | 2690[1] | 35 | 230 | 11.1 | 255.6 | 255.6 | 256.6 | 1.0 |
| F | 2880[1] | 60 | 902 | 2.8 | 267.1 | 267.1 | 267.2 | 0.1 |
| MUD CREEK | | | | | | | | |
| A | 280[2] | 54 | 605 | 4.5 | 583.0 | 576.6[4] | 576.7 | 0.1 |
| B | 1180[2] | 93 | 878 | 3.1 | 583.0 | 576.9[4] | 577.2 | 0.3 |
| C | 2105[2] | 84 | 771 | 3.5 | 583.0 | 577.0[4] | 577.3 | 0.3 |
| D | 2365[2] | 82 | 518 | 5.2 | 583.0 | 577.0[4] | 577.3 | 0.3 |
| E | 3075[2] | 90 | 822 | 3.3 | 583.0 | 577.5[4] | 577.8 | 0.3 |
| F | 3925[2] | 214 | 2390 | 1.2 | 583.0 | 581.1[4] | 582.1 | 1.0 |
| G | 8685[2] | 91 | 1014 | 2.7 | 583.0 | 581.7[4] | 582.7 | 1.0 |
| H | 10385[2] | 72 | 580 | 4.8 | 583.0 | 582.4[4] | 583.4 | 1.0 |
| I | 16840[2] | 192 | 1726 | 1.6 | 585.8 | 585.8 | 586.8 | 1.0 |
| J | 22240[2] | 96 | 972 | 2.5 | 587.5 | 587.5 | 588.4 | 0.9 |
| K | 30075[2] | 262 | 2340 | 1.1 | 590.0 | 590.0 | 590.8 | 0.8 |

[1] Feet above confluence with Lake Ontario
[2] Feet above confluence with Tonawanda Creek
[3] Elevation computed without consideration of backwater effects from Lake Ontario
[4] Elevation computed without consideration of backwater effects from Tonawanda Creek



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**KEG CREEK– MUD CREEK**

| FLOODING SOURCE | | FLOODWAY | | | 1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| NORTH TONAWANDA CREEK | | | | | | | | |
| A | 730[1] | 61 | 417 | 1.3 | 579.2 | * | * | * |
| B | 1540[1] | 60 | 200 | 2.6 | 579.2 | * | * | * |
| C | 1712[1] | 23 | 144 | 3.7 | 579.7 | * | * | * |
| D | 2145[1] | 52 | 364 | 1.5 | 579.9 | * | * | * |
| E | 2735[1] | 23 | 154 | 3.4 | 580.1 | * | * | * |
| F | 4575[1] | 92 | 567 | 0.8 | 580.8 | * | * | * |
| G | 6505[1] | 82 | 441 | 1.0 | 581.6 | * | * | * |
| H | 7965[1] | 122 | 422 | 1.1 | 582.2 | * | * | * |
| I | 9895[1] | 30 | 206 | 2.2 | 582.9 | * | * | * |
| RAYMOND ROAD TRIBUTARY | | | | | | | | |
| A | 770[2] | 49 | 278 | 1.5 | 594.9 | 593.9[4] | 593.9 | 0.0 |
| B | 1840[2] | 30 | 52 | 7.9 | 594.9 | 594.1[4] | 594.1 | 0.0 |
| C | 2620[2] | 28 | 93 | 4.5 | 599.0 | 599.0 | 599.1 | 0.1 |
| D | 4060[2] | 32 | 99 | 3.6 | 602.1 | 602.1 | 602.5 | 0.4 |
| E | 4550[2] | 30 | 107 | 3.4 | 602.9 | 602.9 | 603.4 | 0.5 |
| SAWYER CREEK EAST | | | | | | | | |
| A | 47[3] | 66 | 271 | 1.5 | 575.0 | 569.4[5] | 569.4 | 0.0 |
| B | 268[3] | 46 | 216 | 1.9 | 575.0 | 569.5[5] | 569.5 | 0.0 |
| C | 678[3] | 35 | 166 | 2.5 | 575.0 | 569.6[5] | 569.7 | 0.1 |
| D | 1308[3] | 65 | 257 | 1.6 | 575.0 | 570.1[5] | 570.2 | 0.1 |
| E | 2027[3] | 38 | 183 | 2.3 | 575.0 | 570.4[5] | 570.5 | 0.1 |
| F | 2913[3] | 44 | 201 | 2.1 | 575.0 | 571.0[5] | 571.1 | 0.1 |
| G | 3265[3] | 48 | 230 | 1.8 | 575.0 | 571.4[5] | 571.5 | 0.1 |

[1] Feet above confluence with Erie Canal
[2] Feet above mouth
[3] Feet above confluence with Bull Creek
[4] Elevation computed without consideration of backwater effects
[5] Elevation computed without consideration of backwater effects of Bull Creek
* Data not available

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

# NIAGARA COUNTY, NEW YORK
## (ALL JURISDICTIONS)

# FLOODWAY DATA

# NORTH TONAWANDA CREEK - RAYMOND ROAD TRIBUTARY - SAWYER CREEK EAST

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| SAWYER CREEK EAST (CONTINUED) | | | | | | | | |
| H | 3594 | 47 | 235 | 1.8 | 575.0 | 571.6[2] | 571.7 | 0.1 |
| I | 3779 | 46 | 239 | 1.7 | 575.0 | 571.8[2] | 571.9 | 0.1 |
| J | 4080 | 57 | 266 | 1.6 | 575.0 | 572.0[2] | 572.1 | 0.1 |
| K | 4278 | 43 | 224 | 1.9 | 575.0 | 572.2[2] | 572.3 | 0.1 |
| L | 4702 | 35 | 180 | 2.3 | 575.0 | 572.4[2] | 572.5 | 0.1 |
| M | 4890 | 49 | 216 | 1.9 | 575.0 | 572.6[2] | 572.7 | 0.1 |
| N | 5320 | 50 | 263 | 1.6 | 575.0 | 572.7[2] | 572.8 | 0.1 |
| O | 5521 | 51 | 286 | 1.5 | 575.0 | 573.0[2] | 573.1 | 0.1 |
| P | 5789 | 50 | 275 | 1.5 | 575.0 | 573.1[2] | 573.2 | 0.1 |
| Q | 5978 | 50 | 300 | 1.4 | 575.0 | 573.4[2] | 573.5 | 0.1 |
| R | 6431 | 43 | 238 | 1.8 | 575.0 | 573.8[2] | 573.9 | 0.1 |
| S | 6662 | 45 | 263 | 1.6 | 575.0 | 574.0[2] | 574.1 | 0.1 |
| T | 6801 | 51 | 317 | 1.3 | 575.0 | 574.3[2] | 574.5 | 0.2 |
| U | 7341 | 62 | 379 | 1.1 | 575.0 | 574.8[2] | 574.9 | 0.1 |
| V | 7627 | 72 | 439 | 1.0 | 575.0 | 574.8[2] | 575.0 | 0.2 |
| W | 7797 | 51 | 341 | 1.2 | 575.0 | 575.0 | 575.3 | 0.3 |
| X | 8160 | 54 | 477 | 0.9 | 575.2 | 575.2 | 575.8 | 0.6 |
| Y | 8545 | 50 | 390 | 1.1 | 575.6 | 575.6 | 576.3 | 0.7 |
| Z | 8840 | 61 | 375 | 1.1 | 575.7 | 575.7 | 576.5 | 0.8 |
| AA | 9375 | 62 | 437 | 1.0 | 576.0 | 576.0 | 576.9 | 0.9 |
| AB | 9997 | 95 | 566 | 0.8 | 576.4 | 576.4 | 577.3 | 0.9 |
| AC | 10161 | 107 | 545 | 0.8 | 576.5 | 576.5 | 577.4 | 0.9 |
| AD | 10621 | 93 | 465 | 0.9 | 576.8 | 576.8 | 577.7 | 0.9 |
| AE | 10881 | 97 | 505 | 0.8 | 576.9 | 576.9 | 577.8 | 0.9 |

[1] Feet above confluence with Bull Creek

[2] Elevation computed without consideration of backwater effects of Bull Creek



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**SAWYER CREEK EAST**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| SAWYER CREEK EAST (CONTINUED) | | | | | | | | |
| AF | 11101[1] | 93 | 509 | 0.8 | 577.1 | 577.1 | 577.9 | 0.8 |
| AG | 11354[1] | 71 | 375 | 1.1 | 577.3 | 577.3 | 578.1 | 0.8 |
| AH | 11648[1] | 98 | 659 | 0.3 | 577.3 | 577.3 | 578.3 | 1.0 |
| AI | 12170[1] | 97 | 744 | 0.3 | 577.3 | 577.3 | 578.3 | 1.0 |
| AJ | 12765[1] | 106 | 850 | 0.2 | 577.4 | 577.4 | 578.3 | 0.9 |
| AK | 13102[1] | 106 | 796 | 0.3 | 577.4 | 577.4 | 578.4 | 1.0 |
| AL | 13422[1] | 115 | 862 | 0.2 | 577.4 | 577.4 | 578.4 | 1.0 |
| AM | 13785[1] | 112 | 769 | 0.3 | 577.4 | 577.4 | 578.4 | 1.0 |
| AN | 14245[1] | 118 | 786 | 0.3 | 577.7 | 577.7 | 578.4 | 0.7 |
| AO | 14917[1] | 132 | 772 | 0.3 | 577.7 | 577.7 | 578.4 | 0.7 |
| AP | 15185[1] | 55 | 364 | 0.6 | 577.7 | 577.7 | 578.4 | 0.7 |
| AQ | 15472[1] | 75 | 394 | 0.5 | 577.8 | 577.8 | 578.5 | 0.7 |
| AR | 15797[1] | 63 | 418 | 0.5 | 577.8 | 577.8 | 578.5 | 0.7 |
| AS | 16248[1] | 53 | 343 | 0.6 | 577.9 | 577.9 | 578.5 | 0.6 |
| AT | 16452[1] | 53 | 407 | 0.5 | 577.9 | 577.9 | 578.6 | 0.7 |
| AU | 17267[1] | 62 | 420 | 0.5 | 577.9 | 577.9 | 578.6 | 0.7 |
| AV | 17738[1] | 69 | 462 | 0.4 | 577.9 | 577.9 | 578.7 | 0.8 |
| AW | 18157[1] | 39 | 346 | 0.6 | 577.9 | 577.9 | 578.7 | 0.8 |
| AX | 18569[1] | 47 | 395 | 0.5 | 577.9 | 577.9 | 578.7 | 0.8 |
| SAWYER CREEK WEST | | | | | | | | |
| A | 171[2] | 18 | 40 | 3.2 | 573.0 | 569.2[3] | 569.2 | 0.0 |
| B | 309[2] | 18 | 40 | 3.2 | 573.1 | 569.8[3] | 569.8 | 0.0 |

[1] Feet above confluence with Bull Creek
[2] Feet above confluence with Bergholtz Creek
[3] Elevation computed without consideration of backwater and lateral effects from Bergholtz Creek



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**SAWYER CREEK EAST – SAWYER CREEK WEST**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| SAWYER CREEK WEST (CONTINUED) | | | | | | | | |
| C | 722[1] | 34 | 56 | 2.3 | 573.1 | 571.1[2] | 571.2 | 0.1 |
| D | 976[1] | 64 | 151 | 0.8 | 573.2 | 572.3[2] | 572.6 | 0.3 |
| E | 1728[1] | 26 | 77 | 1.7 | 573.6 | 572.6[2] | 572.8 | 0.2 |
| F | 2377[1] | 65 | 165 | 0.8 | 575.1 | 573.2[2] | 573.4 | 0.2 |
| G | 2647[1] | 36 | 99 | 1.3 | 575.1 | 573.4[2] | 573.6 | 0.2 |
| H | 2758[1] | 45 | 132 | 1.0 | 575.1 | 573.5[2] | 573.8 | 0.3 |
| I | 2937[1] | 21 | 88 | 1.4 | 575.1 | 574.3[2] | 575.2 | 0.9 |
| J | 3078[1] | 42 | 189 | 0.7 | 575.3 | 574.4[2] | 575.2 | 0.8 |
| K | 3293[1] | 180 | 487 | 0.3 | 575.6 | 574.6[2] | 575.4 | 0.8 |
| L | 3570[1] | 106 | 434 | 0.3 | 576.0 | 574.7[2] | 575.4 | 0.7 |
| M | 3926[1] | 138 | 553 | 0.2 | 576.0 | 574.7[2] | 575.4 | 0.7 |
| N | 4097[1] | 159 | 447 | 0.3 | 576.0 | 574.7[2] | 575.4 | 0.7 |
| O | 4923[1] | 121 | 331 | 0.4 | 576.1 | 574.7[2] | 575.5 | 0.8 |
| P | 5154[1] | 53 | 261 | 0.5 | 576.1 | 574.8[2] | 575.6 | 0.8 |
| Q | 5963[1] | 275 | 512 | 0.3 | 576.7 | 576.3[2] | 577.2 | 0.9 |
| R | 6265 | 327 | 1137 | 0.2 | 577.2 | 576.3[2] | 577.2 | 0.9 |
| S | 6670[1] | 381 | 1107 | 0.2 | 577.9 | 576.3[2] | 577.2 | 0.9 |
| T | 6913[1] | 428 | 1050 | 0.2 | 578.1 | 576.4[2] | 577.2 | 0.8 |
| U | 7133[1] | 454 | 1246 | 0.1 | 578.2 | 576.4[2] | 577.2 | 0.8 |
| V | 7541[1] | 461 | 861 | 0.2 | 578.3 | 576.4[2] | 577.2 | 0.8 |
| W | 7766[1] | 215 | 623 | 0.2 | 578.3 | 576.4[2] | 577.2 | 0.8 |
| X | 8146[1] | 196 | 584 | 0.2 | 578.4 | 576.4[2] | 577.2 | 0.8 |
| Y | 8408[1] | 144 | 369 | 0.3 | 578.4 | 576.4[2] | 577.3 | 0.9 |
| Z | 8581[1] | 115 | 376 | 0.3 | 578.4 | 576.4[2] | 577.3 | 0.9 |

[1] Feet above confluence with Bergholtz Creek
[2] Elevation computed without consideration of backwater and lateral effects from Bergholtz Creek



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**SAWYER CREEK WEST**

| FLOODING SOURCE | | FLOODWAY | | | 1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| SAWYER CREEK WEST (CONTINUED) | | | | | | | | |
| AA | 8784[1] | 155 | 608 | 0.2 | 578.4 | 576.4[3] | 577.3 | 0.9 |
| AB | 9287[1] | 189 | 690 | 0.2 | 578.4 | 576.4[3] | 577.4 | 1.0 |
| AC | 9650[1] | 178 | 483 | 0.3 | 578.4 | 576.4[3] | 577.4 | 1.0 |
| AD | 10078[1] | 246 | 670 | 0.2 | 578.4 | 576.4[3] | 577.4 | 1.0 |
| AE | 10790[1] | 98 | 411 | 0.3 | 578.4 | 576.4[3] | 577.4 | 1.0 |
| AF | 11259[1] | 172 | 543 | 0.2 | 578.4 | 576.5[3] | 577.5 | 1.0 |
| AG | 11774[1] | 121 | 440 | 0.3 | 578.4 | 576.5[3] | 577.5 | 1.0 |
| AH | 12004[1] | 77 | 416 | 0.3 | 578.4 | 576.8[3] | 577.7 | 0.9 |
| AI | 12450[1] | 36 | 253 | 0.5 | 578.4 | 576.9[3] | 577.7 | 0.8 |
| AJ | 12884[1] | 19 | 158 | 0.8 | 578.4 | 576.9[3] | 577.7 | 0.8 |
| TONAWANDA CREEK | | | | | | | | |
| A | 2290[2] | 196/115 | 3852 | 4.5 | 570.3 | 569.7[4] | 570.7 | 1.0 |
| B | 8140[2] | 290/170 | 4930 | 3.5 | 571.4 | 571.4 | 572.2 | 0.8 |
| C | 9200[2] | ** | 4713 | 3.5 | 571.5 | 571.5 | 572.2 | 0.7 |
| D | 19850[2] | 190[5] | 3540 | 5.3 | 573.6 | 573.6 | 573.6 | 0.0 |
| E | 24500[2] | 218[5] | 4351 | 4.3 | 574.7 | 574.7 | 574.9 | 0.2 |
| F | 29500[2] | 311[5] | 4741 | 3.8 | 575.8 | 575.8 | 576.0 | 0.2 |
| G | 34540[2] | 293[5] | 4886 | 3.6 | 576.8 | 576.8 | 577.3 | 0.5 |
| H | 35870[2] | 212[5] | 4087 | 4.4 | 576.9 | 576.9 | 577.4 | 0.5 |
| I | 41360[2] | 275[5] | 4984 | 3.6 | 577.4 | 577.4 | 578.0 | 0.6 |
| J | 47220[2] | 225[5] | 4502 | 4.0 | 577.8 | 577.8 | 578.4 | 0.6 |
| K | 51520[2] | 309[5] | 5892 | 3.0 | 578.2 | 578.2 | 578.9 | 0.7 |
| L | 57000[2] | 220[5] | 4212 | 2.7 | 578.8 | 578.8 | 579.4 | 0.6 |

[1] Feet above confluence with Bergholtz Creek

[2] Feet above confluence with Niagara River - Tonawanda Channel

[3] Elevation computed without consideration of backwater and lateral effects from Bergholtz Creek

[4] Elevation computed without consideration of backwater effects from Niagara River - Tonawanda Channel

[5] Width extends beyond county boundary

** Floodway coincident with channel bank

TABLE 9

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

# NIAGARA COUNTY, NEW YORK
**(ALL JURISDICTIONS)**

# FLOODWAY DATA

# SAWYER CREEK WEST - TONAWANDA CREEK

| FLOODING SOURCE | | FLOODWAY | | | 1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| TONAWANDA CREEK (CONTINUED) | | | | | | | | |
| M | 59850[1] | 192[3] | 3151 | 3.7 | 579.2 | 579.2 | 579.8 | 0.6 |
| N | 63900[1] | 200[3] | 3083 | 3.7 | 581.0 | 581.0 | 581.6 | 0.6 |
| O | 69880[1] | 213[3] | 3074 | 2.2 | 583.0 | 583.0 | 583.8 | 0.8 |
| P | 73025[1] | 153[3] | 2608 | 2.6 | 583.6 | 583.6 | 584.6 | 1.0 |
| Q | 76425[1] | 113[3] | 2020 | 3.3 | 584.5 | 584.5 | 585.4 | 0.9 |
| R | 80975[1] | 197[3] | 3181 | 2.1 | 585.3 | 585.3 | 586.3 | 1.0 |
| S | 83625[1] | 135[3] | 2310 | 2.9 | 585.8 | 585.8 | 586.8 | 1.0 |
| T | 89725[1] | 213[3] | 3460 | 1.9 | 587.1 | 587.1 | 588.1 | 1.0 |
| U | 93475[1] | 213[3] | 3480 | 1.9 | 587.6 | 587.6 | 588.6 | 1.0 |
| V | 98725[1] | 182[3] | 2566 | 2.6 | 588.5 | 588.5 | 589.4 | 0.9 |
| W | 101825[1] | 229[3] | 3052 | 2.2 | 589.2 | 589.2 | 590.0 | 0.8 |
| X | 105875[1] | 230[3] | 3264 | 2.1 | 589.9 | 589.9 | 590.8 | 0.9 |
| Y | 109275[1] | * | * | * | 590.5 | * | * | * |
| Z | 115475[1] | * | * | * | 591.2 | * | * | * |
| AA | 122625[1] | * | * | * | 591.5 | * | * | * |
| AB | 128775[1] | * | * | * | 592.0 | * | * | * |
| AC | 133800[1] | * | * | * | 592.7 | * | * | * |
| AD | 144000[1] | * | * | * | 593.0 | * | * | * |
| TOWN DITCH NO. 2 | | | | | | | | |
| A | 0[2] | 29 | 84 | 3.0 | 577.1 | 566.7[4] | 567.0 | 0.3 |
| B | 150[2] | 21 | 100 | 2.6 | 577.1 | 570.3[4] | 570.3 | 0.0 |
| C | 276[2] | 53 | 163 | 1.6 | 577.1 | 570.5[4] | 570.5 | 0.0 |
| D | 397[2] | 18 | 89 | 2.9 | 577.1 | 570.6[4] | 570.6 | 0.0 |

[1] Feet above confluence with Niagara River - Tonawanda Channel

[2] Feet above confluence with Tonawanda Creek

[3] Width extends beyond county boundary

[4] Elevation computed without consideration of backwater and lateral effects from Tonawanda Creek

* Data Not Available

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

# NIAGARA COUNTY, NEW YORK
## (ALL JURISDICTIONS)

# FLOODWAY DATA

# TONAWANDA CREEK - TOWN DITCH NO. 2

| FLOODING SOURCE | | FLOODWAY | | | 1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE [1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| TOWN DITCH NO. 2 (CONTINUED) | | | | | | | | |
| E | 489 | 27 | 152 | 1.7 | 577.1 | 572.3[2] | 572.4 | 0.1 |
| F | 611 | 26 | 141 | 1.8 | 577.1 | 572.3[2] | 572.4 | 0.1 |
| G | 747 | 30 | 147 | 1.7 | 577.1 | 572.4[2] | 572.9 | 0.5 |
| H | 855 | 35 | 201 | 1.3 | 577.1 | 572.5[2] | 572.9 | 0.4 |
| I | 1000 | 13 | 64 | 4.0 | 577.1 | 572.4[2] | 572.9 | 0.5 |
| J | 1158 | 58 | 448 | 0.6 | 577.1 | 575.6[2] | 576.5 | 0.9 |
| K | 1394 | 73 | 500 | 0.5 | 577.1 | 575.6[2] | 576.5 | 0.9 |
| L | 1592 | 63 | 404 | 0.6 | 577.1 | 575.6[2] | 576.5 | 0.9 |
| M | 1736 | 64 | 388 | 0.7 | 577.1 | 575.6[2] | 576.5 | 0.9 |
| N | 1947 | 50 | 289 | 0.9 | 577.1 | 575.6[2] | 576.5 | 0.9 |
| O | 2142 | 51 | 337 | 0.8 | 577.1 | 575.6[2] | 576.6 | 1.0 |
| P | 2295 | 36 | 244 | 1.1 | 577.1 | 575.7[2] | 576.6 | 0.9 |
| Q | 2393 | 35 | 225 | 1.1 | 577.1 | 575.7[2] | 576.6 | 0.9 |
| R | 2517 | 32 | 210 | 1.2 | 577.1 | 575.7[2] | 576.6 | 0.9 |
| S | 2676 | 33 | 217 | 1.2 | 577.1 | 576.3[2] | 577.3 | 1.0 |
| T | 2778 | 51 | 282 | 0.9 | 577.1 | 576.4[2] | 577.4 | 1.0 |
| U | 3009 | 74 | 299 | 0.9 | 577.1 | 576.4[2] | 577.4 | 1.0 |
| V | 3165 | 102 | 585 | 0.4 | 577.2 | 576.4[2] | 577.4 | 1.0 |
| W | 4034 | 214 | 962 | 0.3 | 577.3 | 576.4[2] | 577.4 | 1.0 |
| X | 5353 | 233 | 861 | 0.3 | 577.4 | 576.5[2] | 577.5 | 1.0 |
| Y | 6339 | 310 | 983 | 0.3 | 577.5 | 576.5[2] | 577.5 | 1.0 |
| Z | 7874 | 211 | 846 | 0.3 | 577.6 | 576.6[2] | 577.5 | 0.9 |
| AA | 8908 | 185 | 517 | 0.5 | 577.6 | 576.6[2] | 577.6 | 1.0 |
| AB | 9066 | 250 | 640 | 0.4 | 577.6 | 576.6[2] | 577.6 | 1.0 |

[1] Feet above confluence with Tonawanda Creek

[2] Elevation computed without consideration of backwater and lateral effects from Tonawanda Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**TOWN DITCH NO. 2**

| FLOODING SOURCE | | FLOODWAY | | | 1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| TOWN DITCH NO. 2 (CONTINUED) | | | | | | | | |
| AC | 10082[1] | 85 | 284 | 0.9 | 577.6 | 576.7[3] | 577.7 | 1.0 |
| AD | 10232[1] | 67 | 234 | 0.7 | 577.6 | 576.7[3] | 577.7 | 1.0 |
| AE | 10349[1] | 23 | 121 | 1.4 | 577.7 | 577.3[3] | 578.3 | 1.0 |
| AF | 10642[1] | 130 | 491 | 0.4 | 577.8 | 577.3[3] | 578.3 | 1.0 |
| AG | 11572[1] | 196 | 780 | 0.2 | 577.8 | 577.3[3] | 578.3 | 1.0 |
| AH | 13059[1] | 117 | 312 | 0.6 | 577.9 | 577.4[3] | 578.4 | 1.0 |
| AI | 14385[1] | 114 | 409 | 0.4 | 578.0 | 577.5[3] | 578.5 | 1.0 |
| TWELVEMILE CREEK | | | | | | | | |
| A | 300[2] | 280 | 2254 | 2.4 | 251.4 | 251.4 | 251.7 | 0.3 |
| B | 670[2] | 290 | 2485 | 2.2 | 251.5 | 251.5 | 251.8 | 0.3 |
| C | 1730[2] | 205 | 2022 | 2.7 | 251.8 | 251.8 | 252.0 | 0.2 |
| D | 1890[2] | 205 | 1817 | 3.0 | 251.8 | 251.8 | 252.0 | 0.2 |
| E | 2690[2] | 263 | 1870 | 2.9 | 252.2 | 252.2 | 252.4 | 0.2 |
| F | 3440[2] | 240 | 1719 | 3.2 | 252.6 | 252.6 | 252.8 | 0.2 |
| G | 4790[2] | 205 | 1578 | 3.5 | 253.4 | 253.4 | 253.6 | 0.2 |
| H | 6020[2] | 215 | 1615 | 3.4 | 254.2 | 254.2 | 254.4 | 0.2 |
| I | 7920[2] | 160 | 1338 | 4.1 | 255.4 | 255.4 | 255.6 | 0.2 |
| J | 9770[2] | 163 | 1182 | 4.7 | 257.4 | 257.4 | 257.5 | 0.1 |
| K | 10920[2] | 150 | 1245 | 4.4 | 259.5 | 259.5 | 260.0 | 0.5 |
| L | 12380[2] | 150 | 1100 | 5.0 | 263.4 | 263.4 | 264.0 | 0.6 |
| M | 13500[2] | 149 | 1405 | 3.9 | 267.3 | 267.3 | 267.8 | 0.5 |
| N | 15040[2] | 161 | 1581 | 3.5 | 269.8 | 269.8 | 270.4 | 0.6 |

[1] Feet above confluence with Tonawanda Creek

[2] Feet above confluence with Lake Ontario

[3] Elevation computed without consideration of backwater and lateral effects from Tonawanda Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**TOWN DITCH NO. 2 - TWELVEMILE CREEK**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| TWELVEMILE CREEK (CONTINUED) | | | | | | | | |
| O | 15310 | 150 | 1700 | 3.2 | 273.9 | 273.9 | 273.9 | 0.0 |
| P | 17510 | 230 | 1158 | 4.7 | 275.4 | 275.4 | 276.3 | 0.9 |
| Q | 19960 | 250 | 1374 | 3.2 | 281.9 | 281.9 | 282.4 | 0.5 |
| R | 22110 | 300 | 1991 | 2.2 | 284.0 | 284.0 | 284.9 | 0.9 |
| S | 23130 | 200 | 938 | 4.7 | 285.0 | 285.0 | 285.6 | 0.6 |
| T | 25530 | 450 | 2304 | 1.9 | 289.8 | 289.8 | 290.0 | 0.2 |
| U | 26380 | 150 | 1969 | 2.2 | 289.8 | 289.8 | 290.7 | 0.9 |
| V | 26550 | 150 | 1289 | 3.4 | 293.0 | 293.0 | 293.0 | 0.0 |
| W | 28530 | 180 | 1528 | 2.9 | 294.8 | 294.8 | 294.8 | 0.0 |
| X | 31710 | 180 | 1482 | 3.0 | 296.5 | 296.5 | 297.5 | 1.0 |
| Z | 43500 | 211 | 2003 | 1.9 | 303.8 | 303.8 | 304.4 | 0.6 |
| AA | 46850 | 156 | 1146 | 2.0 | 305.5 | 305.5 | 306.0 | 0.5 |
| AB | 50500 | 182 | 1480 | 1.6 | 307.3 | 307.3 | 307.9 | 0.6 |
| TWELVEMILE CREEK EAST BRANCH | | | | | | | | |
| A | 4400 | 150 | 1066 | 5.4 | 250.3 | 250.3 | 250.6 | 0.3 |
| B | 5100 | 350 | 18232 | 3.1 | 251.2 | 251.2 | 251.7 | 0.5 |
| C | 6100 | 356 | 2088 | 2.7 | 252.0 | 252.0 | 252.9 | 0.9 |
| D | 7475 | 180 | 1606 | 3.6 | 253.9 | 253.9 | 254.6 | 0.7 |
| E | 7670 | 193 | 1654 | 3.5 | 256.1 | 256.1 | 256.4 | 0.3 |
| F | 7970 | 203 | 1654 | 3.5 | 256.5 | 256.5 | 257.0 | 0.5 |
| G | 8210 | 160 | 792 | 7.2 | 256.5 | 256.5 | 257.0 | 0.5 |
| H | 8395 | 155 | 1053 | 5.4 | 257.6 | 257.6 | 258.1 | 0.5 |
| I | 9885 | 300 | 1156 | 4.9 | 262.7 | 262.7 | 262.7 | 0.0 |

[1] Feet above confluence with Lake Ontario



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**TWELVEMILE CREEK -**
**TWELVEMILE CREEK EAST BRANCH**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| TWELVEMILE CREEK EAST BRANCH (CONTINUED) | | | | | | | | |
| J | 10695 | 105 | 583 | 9.8 | 268.0 | 268.0 | 268.1 | 0.1 |
| K | 11395 | 300 | 1049 | 3.5 | 273.5 | 273.5 | 273.8 | 0.3 |
| L | 13550 | 280 | 1486 | 3.8 | 277.8 | 277.8 | 278.4 | 0.6 |
| M | 15050 | 300 | 1735 | 3.3 | 280.7 | 280.7 | 280.9 | 0.2 |
| N | 17250 | 300 | 1153 | 5.0 | 284.8 | 284.8 | 285.3 | 0.5 |
| O | 19875 | 380 | 1590 | 3.2 | 292.5 | 292.5 | 292.5 | 0.0 |
| P | 20005 | 380 | 2966 | 1.7 | 294.3 | 294.3 | 294.3 | 0.0 |
| Q | 22040 | 380 | 1999 | 2.5 | 295.3 | 295.3 | 295.3 | 0.0 |
| R | 24540 | 320 | 1487 | 3.4 | 296.9 | 296.9 | 297.9 | 1.0 |
| S | 26790 | 223 | 1478 | 3.4 | 301.2 | 301.2 | 302.1 | 0.9 |
| T | 28190 | 274 | 1556 | 3.2 | 303.6 | 303.6 | 304.4 | 0.8 |
| U | 30310 | 250 | 1291 | 3.9 | 309.8 | 309.8 | 310.2 | 0.4 |
| V | 30430 | 275 | 1547 | 3.2 | 311.0 | 311.0 | 311.3 | 0.3 |
| W | 33485 | 300 | 1667 | 3.0 | 318.8 | 318.8 | 319.4 | 0.6 |
| X | 34385 | 300 | 1782 | 2.8 | 320.1 | 320.1 | 320.8 | 0.7 |
| Y | 34575 | 300 | 2100 | 2.4 | 321.0 | 321.0 | 322.0 | 1.0 |
| Z | 37375 | 250 | 891 | 5.2 | 326.0 | 326.0 | 326.0 | 0.0 |
| AA | 37495 | 200 | 1120 | 4.5 | 327.5 | 327.5 | 327.5 | 0.0 |
| AB | 38795 | 306 | 1702 | 3.0 | 329.9 | 329.9 | 330.4 | 0.5 |
| AC | 42045 | 270 | 1998 | 2.5 | 338.9 | 338.9 | 339.6 | 0.7 |

[1] Feet above confluence with Lake Ontario



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**TWELVEMILE CREEK EAST BRANCH**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| TWELVEMILE CREEK EAST BRANCH (CONTINUED) | | | | | | | | |
| AD | 42995 | 230 | 1286 | 3.9 | 339.8 | 339.8 | 340.3 | 0.5 |
| AE | 45895 | 302 | 1822 | 2.8 | 343.9 | 343.9 | 344.3 | 0.4 |
| AF | 48095 | 354 | 1711 | 2.9 | 346.2 | 346.2 | 346.8 | 0.6 |
| AG | 49495 | 350 | 1818 | 2.4 | 348.0 | 348.0 | 348.7 | 0.7 |
| AH | 51195 | 300 | 1466 | 3.0 | 349.6 | 349.6 | 350.6 | 1.0 |
| AI | 53695[1] | 150 | 1285 | 3.4 | 354.1 | 354.1 | 354.3 | 0.2 |
| AJ | 53845[1] | 255 | 1634 | 2.7 | 355.4 | 355.4 | 355.6 | 0.2 |
| AK | 55345[1] | 300 | 1609 | 2.7 | 357.1 | 357.1 | 357.4 | 0.3 |
| AL | 56845[1] | 296 | 1575 | 2.8 | 358.6 | 358.6 | 359.2 | 0.6 |
| AM | 59345[1] | 200 | 1178 | 3.7 | 361.5 | 361.5 | 361.9 | 0.4 |
| AN | 59505[1] | 200 | 1807 | 2.4 | 363.1 | 363.1 | 363.2 | 0.1 |
| AO | 60855[1] | 264 | 1817 | 2.4 | 364.0 | 364.0 | 364.0 | 0.0 |
| AP | 62955[1] | 300 | 2270 | 1.5 | 364.6 | 364.6 | 365.1 | 0.5 |
| AQ | 65005[1] | 301 | 1714 | 1.9 | 366.1 | 366.1 | 366.3 | 0.2 |
| AR | 67405[1] | 300 | 1357 | 2.4 | 366.7 | 366.7 | 367.2 | 0.5 |
| AS | 70005[1] | 300 | 1919 | 1.7 | 368.9 | 368.9 | 369.7 | 0.8 |
| AT | 71300[1] | 143 | 737 | 3.5 | 369.9 | 369.9 | 370.8 | 0.9 |
| AU | 73100[1] | 88 | 669 | 3.9 | 372.3 | 372.3 | 373.3 | 1.0 |

[1] Feet above confluence with Lake Ontario



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**TWELVEMILE CREEK EAST BRANCH**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| TWELVEMILE CREEK EAST BRANCH. EAST TRIBUTARY | | | | | | | | |
| A | 2000[1] | 300 | 1154 | 0.6 | 364.6 | 364.6 | 365.6 | 1.0 |
| B | 4030[1] | 300 | 870 | 0.8 | 365.6 | 365.6 | 366.1 | 0.5 |
| C | 5030[1] | 250 | 418 | 1.5 | 366.1 | 366.1 | 366.9 | 0.8 |
| D | 5140[1] | 200 | 508 | 1.2 | 367.8 | 367.8 | 367.9 | 0.1 |
| TWELVEMILE CREEK EAST BRANCH. SOUTH TRIBUTARY | | | | | | | | |
| A | 2430[2] | 120 | 676 | 0.6 | 365.8 | 365.8 | 366.3 | 0.5 |
| B | 3930[2] | 120 | 685 | 0.5 | 365.8 | 365.8 | 366.6 | 0.8 |
| C | 4530[2] | 120 | 440 | 0.5 | 365.9 | 365.9 | 366.8 | 0.9 |
| TWELVEMILE CREEK TRIBUTARY 3 | | | | | | | | |
| A | 4000[3] | 143 | 679 | 2.1 | 316.2 | 316.2 | 316.8 | 0.6 |
| B | 7200[3] | 143 | 562 | 1.6 | 319.9 | 319.9 | 320.6 | 0.7 |
| TWELVEVMILE CREEK TRIBUTARY 3A | | | | | | | | |
| A | 1100[4] | 89 | 281 | 0.4 | 318.8 | 318.8 | 319.8 | 1.0 |
| B | 4300[4] | 20 | 36 | 7.7 | 323.0 | 323.0 | 324.0 | 1.0 |

[1] Feet above confluence with Twelvemile Creek East Branch
[2] Feet above confluence with Twelvemile Creek East Branch, East Tributary
[3] Feet above confluence with Twelvemile Creek
[4] Feet above confluence with Twelvemile Creek Tributary 3



TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK**
**(ALL JURISDICTIONS)**

**FLOODWAY DATA**

**TWELVEMILE CREEK EAST BRANCH, EAST TRIBUTARY - TWELVEMILE CREEK EAST BRANCH, SOUTH TRIBUTARY - TWELVEMILE CREEK TRIBUTARY 3 - TWELVEMILE CREEK TRIBUTARY 3A**

## 5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 1-percent annual chance floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 1-percent annual chance floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 1-percent annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 1-percent annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot base flood depths derived from the detailed hydraulic analyses are shown within this zone.

Zone AR

Zone AR is the flood insurance rate zone that corresponds to the area of special flood hazard formerly protected from the 1-percent annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1-percent annual chance or greater flood event.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 1-percent annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 1-percent annual chance coastal floodplains that have additional hazards associated with storm waves. Because approximate

hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 1-percent annual chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 0.2-percent annual chance floodplain, areas within the 0.2-percent annual chance floodplain, and to areas of 1-percent annual chance flooding where average depths are less than 1 foot, areas of 1-percent annual chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent annual chance flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

## 6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 1-percent annual chance floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 1- and 0.2-percent annual chance floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

The current FIRM presents flooding information for the entire geographic area of Niagara County. Previously, separate Flood Hazard Boundary Maps and/or FIRMs were prepared for each identified flood-prone jurisdiction in Niagara County. This countywide FIRM also includes flood hazard information that was presented separately on Flood Boundary and Floodway Maps (FBFMs), where applicable. Historical data relating to the maps prepared for each community, up to and including this countywide FIS, are presented in Table 10, "Community Map History."

## 7.0 OTHER STUDIES

Information pertaining to each jurisdiction within Niagara County has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS Reports, FHBMs, FBFMs, and FIRMs for all jurisdictions within Niagara County.

This is a multi-volume FIS. Each volume may be revised separately, in which case it supersedes the previously printed volume. Users should refer to the Table of Contents in Volume 1 for the current effective date of each volume; volumes bearing these dates contain the most up-to-date flood hazard data.

| COMMUNITY NAME | INITIAL IDENTIFICATION | FLOOD HAZARD BOUNDARY MAP REVISIONS DATE | FIRM EFFECTIVE DATE | FIRM REVISIONS DATE |
|---|---|---|---|---|
| Barker, Village of | May 3, 1974 | June 11, 1976 | May 1, 1984 | None |
| Cambria Town of | April 12, 1974 | September 3, 1976 | September 30, 1983 | None |
| Hartland, Town of | April 12, 1974 | May 21, 1976 | October 7, 1983 | None |
| Lewiston, Town of | April 12, 1974 | August 6, 1976 | June 18, 1980 | None |
| Lockport, City of | October 22, 1976 | None | February 4, 1981 | None |
| Lockport, Town of | October 22, 1976 | None | September 2, 1981 | February 19, 1992<br>October 4, 2002 |
| Middleport, Village of | May 31, 1974 | December 26, 1975 | August 1, 1983 | None |
| Newfane, Town of | May 17, 1974 | April 23, 1976 | November 18, 1981 | None |
| Niagara Falls, City of | March 29, 1974 | November 14, 1975 | March 16, 1983 | September 5, 1990 |
| Niagara, Town of | March 22, 1974 | April 30, 1976 | June 15, 1984 | None |
| North Tonawanda, City of | April 12, 1974 | May 7, 1976 | January 6, 1982 | None |
| Pendleton, Town of | May 31, 1974 | April 16, 1976 | January 6, 1982 | None |
| Porter, Town of | April 12, 1974 | November 19, 1976 | August 15, 1983 | None |

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

# NIAGARA COUNTY, NEW YORK (ALL JURISDICTIONS)

# COMMUNITY MAP HISTORY

| COMMUNITY NAME | INITIAL IDENTIFICATION | FLOOD HAZARD BOUNDARY MAP REVISIONS DATE | FIRM EFFECTIVE DATE | FIRM REVISIONS DATE |
|---|---|---|---|---|
| Royalton, Town of | May 3, 1974 | September 12, 1975 | July 6, 1979 | None |
| Somerset, Town of | March 15, 1974 | June 18, 1976 | February 3, 1982 | None |
| Wheatfield, Town of | January 16, 1974 | July 30, 1976 | July 16, 1981 | March 1, 1984<br>February 2, 1989<br>November 4, 1992 |
| Wilson, Town of | May 17, 1974 | July 23, 1976 | February 1, 1978 | April 1, 1981 |
| Wilson, Village of | April 5, 1974 | June 11, 1976 | April 17, 1978 | November 19, 1980 |
| Youngstown, Village of | March 1, 1974 | July 23, 1976 | June 4, 1980 | None |

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

# NIAGARA COUNTY, NEW YORK (ALL JURISDICTIONS)

# COMMUNITY MAP HISTORY

## 8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this FIS can be obtained by contacting FEMA, Federal Insurance and Mitigation Division, 26 Federal Plaza, Room 1351, New York, New York 10278.

## 9.0 BIBLIOGRAPHY AND REFERENCES


Bill Endell, River Control Division, U.S. Army Corps of Engineers (Undated). Personal Communication.

Boss International, Inc. (April 12, 2007). RiverCAD XP for AutoCAD, Release 2007.3 for Windows. Madison, Wisconsin.

Erie-Niagara Basin, Regional Water Resources Planning Board. (1968). Basic Planning Report ENG-2, Surface Water in the Erie-Niagara Basin, New York. Buffalo, New York.

Erie and Niagara Counties Regional Planning Board. (1978). 208 Area wide Waste Treatment Management Study, Environmental Inventory. Albany, New York.

Erie and Niagara Counties Regional Planning Board. (March 1974). Gill Creek, Enhancement of Environmental Quality. Buffalo, New York.

Erie and Niagara Counties Regional Planning Board. (July 1972). Storm Drainage Design Manual. Buffalo, New York.

Federal Emergency Management Agency. (October 4, 2002). Flood Insurance Rate Map, Town of Lockport, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (October 4, 2002). Flood Insurance Study, Town of Lockport, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (March 5, 1996). Flood Insurance Study, Town of Clarence, Erie County, New York. Washington, D.C.

Federal Emergency Management Agency. (November 4, 1992). Flood Boundary and Floodway Map, Town of Wheatfield, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (November 4, 1992). Flood Insurance Rate Map, Town of Wheatfield, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (November 4, 1992). Flood Insurance Study, Town of Wheatfield, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (February 19, 1992). Flood Insurance Rate Map, Town of Lockport, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (February 19, 1992). Flood Insurance Study, Town of Lockport, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (September 5, 1990). Flood Boundary and Floodway Map, City of Niagara Falls, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (September 5, 1990). Flood Insurance Rate Map, City of Niagara Falls, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (September 5, 1990). Flood Insurance Study, City of Niagara Falls, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (February 2, 1989). Flood Insurance Rate Map, Town of Wheatfield, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (June 15, 1984). Flood Boundary and Floodway Map, Town of Niagara, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (June 15, 1984). Flood Insurance Rate Map, Town of Niagara, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (May 1, 1984). Flood Boundary and Floodway Map, Village of Barker, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (May 1, 1984). Flood Insurance Rate Map, Village of Barker, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (March 1, 1984). Flood Insurance Rate Map, Town of Wheatfield, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (December 15, 1983). Flood Insurance Study, Town of Niagara, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (November 1, 1983). Flood Insurance Study, Village of Barker, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (October 7, 1983). Flood Insurance Rate Map, Town of Hartland, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (September 30, 1983). Flood Boundary and Floodway Map, Town of Cambria, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (September 30, 1983). Flood Insurance Rate Map, Town of Cambria, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (August 15, 1983). Flood Boundary and Floodway Map, Town of Porter, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (August 15, 1983). Flood Insurance Rate Map, Town of Porter, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (August 1, 1983). Flood Insurance Rate Map, Village of Middleport, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (March 30, 1983). Flood Insurance Study, Town of Cambria, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (March 16, 1983). Flood Boundary and Floodway Map, City of Niagara Falls, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (March 16, 1983). Flood Insurance Rate Map, City of Niagara Falls, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (February 15, 1983). Flood Insurance Study, Town of Porter, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (February 1, 1983). Flood Insurance Study, Village of Middleport, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (September 16, 1982). Flood Insurance Study, City of Niagara Falls, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (February 3, 1982). Flood Boundary and Floodway Map, Town of Somerset, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (February 3, 1982). Flood Insurance Rate Map, Town of Somerset, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (January 6, 1982). Flood Boundary and Floodway Map, City of North Tonawanda, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (January 6, 1982). Flood Insurance Rate Map, City of North Tonawanda, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (January 6, 1982). Flood Boundary and Floodway Map, Town of Pendleton, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (January 6, 1982). Flood Insurance Rate Map, Town of Pendleton, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (September 2, 1981). Flood Insurance Rate Map, Town of Lockport, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (August 3, 1981). Flood Insurance Study, Town of Somerset, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (July 16, 1981). Flood Insurance Rate Map, Town of Wheatfield, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (July 6, 1981). Flood Insurance Study, City of North Tonawanda, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (July 6, 1981). Flood Insurance Study, Town of Pendleton, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency. (May 18, 1981). Flood Insurance Study, Town of Newfane, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency, Federal Insurance Administration. (November 18, 1981). Flood Boundary and Floodway Map, Town of Newfane, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency, Federal Insurance Administration. (November 18, 1981). Flood Insurance Rate Map, Town of Newfane, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency, Federal Insurance Administration. (April 1, 1981). Flood Boundary and Floodway Map, Town of Wilson, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency, Federal Insurance Administration. (April 1, 1981). Flood Insurance Rate Map, Town of Wilson, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency, Federal Insurance Administration. (March 2, 1981). Flood Insurance Study, Town of Lockport, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency, Federal Insurance Administration. (February 4, 1981). Flood Boundary and Floodway Map, City of Lockport, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency, Federal Insurance Administration. (February 4, 1981). Flood Insurance Rate Map, City of Lockport, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency, Federal Insurance Administration. (November 19, 1980). Flood Boundary and Floodway Map, Village of Wilson, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency, Federal Insurance Administration. (November 19, 1980). Flood Insurance Rate Map, Village of Wilson, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency, Federal Insurance Administration. (October 1, 1980). Flood Insurance Study, Town of Wilson, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency, Federal Insurance Administration. (August 4, 1980). Flood Insurance Study, City of Lockport, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency, Federal Insurance Administration. (May, 1980). Flood Insurance Study, Village of Wilson, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency, Federal Insurance Administration. (December 1979). Flood Insurance Study, Town of Lewiston, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency, Federal Insurance Administration. (December 1979). Flood Insurance Study, Village of Youngstown, Niagara County, New York. Washington, D.C.

Federal Emergency Management Agency, Federal Insurance Administration. (April 17, 1978). Flood Insurance Rate Map, Village of Wilson, Niagara County, New York. Washington, D.C.

Goodkind and O'Dea, Inc. (1978). Preliminary Hydrological Data for Western New York, "Frequency-Discharge, Drainage Area Curves, All Drainage Basins Except Tonawanda Creek Basin."

Herbert H. Smith and Associates. (December 1972). A Comprehensive Plan for the Village of Youngstown, Volume 1, prepared for the State of New York, Office of Planning Services.

Krehbiel, Guay, Rugg, and Hall. (February 1976). Drainage Study for the Town of Lewiston.

McNamee, Porter and Seeley. (January 1974). Lockport, New York, Combined Sewer Study.

National Oceanic & Atmospheric Administration, National Weather Service. (Retrieved January 2007). Buffalo, NY Forecast Office, Average Annual Precipitation Map. http://www.erh.noaa.gov/buf/hydrology.htm.

Ontario-Hydro Corporation, Civil Works Department. (Unpublished). Gage Data on Niagara River.

State of New York, Department of Environmental Conservation, Water Resources Commission. (1968). Bulletin No. 67, Maximum Known Discharges of New York Streams. Albany, New York.

State of New York, Department of Transportation. (1975). Barge Canal System and Connecting Waterways. Albany, New York.

Thornbury, William D. of John Wiley & Sons, Inc. (1965). Regional Geomorphology of the United States. New York.

U.S. Army Corps of Engineers. (1973). Shore Protection Manual, Volumes 1, 2, and 3. Fort Belvoir, Virginia.

U.S. Army Corps of Engineers, Buffalo District. (June 2005). Hydrology and Hydraulic Report for Cayuga Creek and Unnamed Tributary to Cayuga Creek, Niagara Falls, New York. Buffalo, New York.

U.S. Army Corps of Engineers, Buffalo District. (January 1990). Buffalo River / Lower Tonawanda Creek Draft Feasibility and Environmental Impact Statement. Buffalo, New York.

U.S. Army Corps of Engineers, Buffalo District. (August 1986). Flood Damage Study, Tonawanda Channel, Upper Niagara River, New York. Buffalo, New York.

U.S. Army Corps of Engineers, Buffalo District. (1976; updated 1978). Buffalo Metropolitan Area, New York, Water Resources Management Study, Interim Report on Feasibility of Flood Management in Tonawanda Creek Watershed. Buffalo, New York.

U.S. Army Corps of Engineers, Buffalo District. (June 26, 1975). Reconnaissance Report to Update Section 205, Definite Project Report for Flood Control on Little Niagara River and Cayuga Creek at and in the Vicinity of Cayuga Island, Niagara County, New York. Buffalo, New York.

U.S. Army Corps of Engineers, Buffalo District. (August 1967). Flood Plain Information Report, Tonawanda Creek and Its Affected Tributaries, Erie and Niagara Counties, New York. Buffalo, New York.

U.S. Army Corps of Engineers, Buffalo District. (May 1967). Flood Plain Information, Cayuga Creek. Buffalo, New York.

U.S. Army Corps of Engineers, Detroit District. (April 1988). Revised Report on Great Lakes Open-Coast Flood Levels – Phase I. Detroit, Michigan.

U.S. Army Corps of Engineers, Detroit District. (February 1977). Great Lakes Open Coast Flood Levels. Detroit, Michigan.

U.S. Army Corps of Engineers, Detroit District. (October 1975). Great Lakes 100-Year Open Coast Flood Levels, Volume 2. Detroit, Michigan.

U.S. Army Corps of Engineers, Detroit District. (December 1974). Great Lakes 100-Year Open Coast Flood Levels, Volume 1. Detroit, Michigan.

U.S. Army Corps of Engineers, Detroit District. (September 1974). Regulation of Lakes Superior and Ontario, Plan 1958D. Detroit, Michigan.

U.S. Army Corps of Engineers, Great Lakes Basin Commission. (1975). Great Lakes Basin Framework Study, Appendix 14 – Flood Plains.

U.S. Army Corps of Engineers, Hydrologic Engineering Center. (May 2005). HEC-RAS River Analysis System, Version 3.1.3. Davis, California.

U.S. Army Corps of Engineers, Hydrologic Engineering Center. (November 2002). HEC-RAS River Analysis System Users Manual. Davis, California.

U.S. Army Corps of Engineers, Hydrologic Engineering Center. (May 1991). HEC-2 Water Surface Profiles, Version 4.62. Davis, California.

U.S. Army Corps of Engineers, Hydrologic Engineering Center. (October 1970; revised December 5, 1988). HEC-1 Flood Hydrograph Package. Davis, California.

U.S. Army Corps of Engineers, Hydrologic Engineering Center. (October 1973; updated November 1977 and January 1981). HEC-2 Water Surface Profiles, Users Manual. Davis, California.

U.S. Army Corps of Engineers, Hydrologic Engineering Center. (June 1974). Application of the HEC-2 Bridge Routines, Training Document No. 6. Davis, California.

U.S. Army Corps of Engineers, Hydrologic Engineering Center. (May 1974). Floodway Determination Using Computer Program HEC-2, Training Document No. 5. Davis, California.

U.S. Army Corps of Engineers, Hydrologic Engineering Center. (October 1973). HEC-2 Water Surface Profiles, Generalized Computer Program. Davis, California.

U.S. Army Corps of Engineers, Hydrologic Engineering Center. (Undated). Hydraulic Engineering Circular No. 46, Regional Frequency Analysis. Davis, California.

U.S. Department of Agriculture, Soil Conservation Service. (May 1982). TR-20 Project Formulation - Hydrology. Washington, D.C.

U.S. Department of Agriculture, Soil Conservation Service. (October 1972). Soil Survey of Niagara County, New York. Washington, D.C.

U.S. Department of Commerce, Bureau of the Census. (1991). 1990 Census of Population, Number of Inhabitants, New York. Washington, D.C.

U.S. Department of Commerce, Bureau of the Census. (1981). 1980 Census of Population, Number of Inhabitants, New York. Washington, D.C.

U.S. Department of Commerce, Bureau of the Census. (1971). 1970 Census of Population, Number of Inhabitants, New York. Washington, D.C.

U.S. Department of Commerce, Bureau of Public Roads. (November 1963). Hydraulic Circular No. 4, Estimating Peak Rates of Runoff from Small Watersheds in Portions of New York. Washington, D.C.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration. (1979). Local Climatological Data. Buffalo, New York.

U.S. Department of Commerce, Weather Bureau. (January 1963) Technical Paper No. 40, Rainfall Frequency Atlas of the United States. Washington, D.C.

U.S. Department of Housing and Urban Development, Federal Insurance Administration. (June 18, 1980). Flood Boundary and Floodway Map, Town of Lewiston, Niagara County, New York. Washington, D.C.

U.S. Department of Housing and Urban Development, Federal Insurance Administration. (June 18, 1980). Flood Insurance Rate Map, Town of Lewiston, Niagara County, New York. Washington, D.C.

U.S. Department of Housing and Urban Development, Federal Insurance Administration. (June 4, 1980). Flood Insurance Rate Map, Village of Youngstown, Niagara County, New York. Washington, D.C.

U.S. Department of Housing and Urban Development, Federal Insurance Administration. (July 6, 1979). Flood Insurance Rate Map, Town of Royalton, Niagara County, New York. Washington, D.C.

U.S. Department of Housing and Urban Development, Federal Insurance Administration. (March 1978). Flood Insurance Study, Town of Yates, Orleans County, New York. Washington, D.C.

U.S. Department of the Interior, Geological Survey. (Retrieved May 2008). USGS 04218000: Tonawanda Creek at Rapids, NY, National Water Information System: Web Interface. http://waterdata.usgs.gov/nwis/inventory.

U.S. Department of the Interior, Geological Survey. (Retrieved May 2008). USGS 04218592: Donner Brook near Lockport, NY, National Water Information System: Web Interface. http://waterdata.usgs.gov/nwis/inventory.

U.S. Department of the Interior, Geological Survey. (2006). Prepared in cooperation with the New York Department of Transportation, Scientific Investigation Report 2006-5112, Magnitude and Frequency of Floods in New York, Richard Lumia, Douglas a. Freehafer and Martyn J. Smith. Reston, Virginia.

U.S. Department of the Interior, Geological Survey. (2002). Water-Resources Investigation Report 02-4168, The National Flood Frequency Program, Version 3, A Computer Program for Estimating Magnitude and Frequency of Floods for Ungaged Sites. Reston, Virginia.

U.S. Department of the Interior, Geological Survey. (1994). Water-Resources Investigation Report 94-4002, Nationwide Summary of U.S. Geological Survey Regional Regression Equations for Estimation of Magnitude and Frequency of Floods for Ungaged Sites, 1993. Reston, Virginia.

U.S. Department of the Interior, Geological Survey. (1991). Prepared in cooperation with the New York Department of Transportation, Water-Resources Investigation Report 90-4197, Regionalization of Flood Discharges for Rural, Unregulated Streams in New York, excluding Long Island, Richard Lumia. Albany, New York

U.S. Department of the Interior, Geological Survey. (1983). Water Supply Paper 2207, Flood characteristics of urban watersheds in the United States, V.B. Sauer, W.O. Thomas, Jr., V.A. Stricker and K.V. Wilson. Washington, D.C.

U.S. Department of the Interior, Geological Survey. (1979). Water Resources Investigations 79-83. Techniques for Estimating Magnitude and Frequency of Floods on Rural Unregulated Streams in New York State Excluding Long Island. Albany, New York.

U.S. Department of the Interior, Geological Survey. (1978). Log-Pearson Type III Frequency Analysis Following Water Resources Council Guidelines, Systematic Records; Alabama Gage No. 04217500 on Tonawanda Creek. Washington, D.C.

U.S. Department of the Interior, Geological Survey. (1973). 7.5-Minute Series Topographic Map, Scale 1:24,000, Contour Interval 10 Feet: Niagara Falls, New York.

U.S. Department of the Interior, Geological Survey. (1973). Map of Flood-Prone Areas, Scale 1:24,000, Contour Interval 10 Feet: Lockport, New York.

U.S. Department of the Interior, Geological Survey. (1973). Map of Flood-Prone Areas, Scale 1:24,000, Contour Interval 10 Feet: Niagara Falls, New York.

U.S. Department of the Interior, Geological Survey. (Published Annually 1963-1973). Water Resources Data for New York, Part 1, Surface Water Records. Washington, D.C.

U.S. Department of the Interior, Geological Survey. (1970). Map of Flood-Prone Areas, Scale 1:24,000, Contour Interval 10 Feet: Tonawanda East, New York.

U.S. Department of the Interior, Geological Survey. (1968). Water-Supply Paper 1677, Magnitude and Frequency of Floods in the United States, Part 4, St. Lawrence River Basin. Washington, D.C.

U.S. Department of the Interior, Geological Survey. (1967). Water-Supply Paper 1849, Roughness Characteristics of Natural Channels. Washington, D.C.

U.S. Department of the Interior, Geological Survey. (1965). 7.5-Minute Series Topographic Map, Scale 1:24,000, Contour Interval 10 Feet: Cambria, New York.

U.S. Department of the Interior, Geological Survey. (1965). 7.5-Minute Series Topographic Map, Scale 1:24,000, Contour Interval 20 Feet: Clarence Center, New York.

U.S. Department of the Interior, Geological Survey. (1965). 7.5-Minute Series Topographic Map, Scale 1:24,000, Contour Interval 20 Feet: Gasport, New York.

U.S. Department of the Interior, Geological Survey. (1965). 7.5-Minute Series Topographic Map, Scale 1:24,000, Contour Interval 10 Feet: Lewiston, New York.

U.S. Department of the Interior, Geological Survey. (1965). 7.5-Minute Series Topographic Map, Scale 1:24,000, Contour Interval 10 Feet: Lockport, New York.

U.S. Department of the Interior, Geological Survey. (1965). 7.5-Minute Series Topographic Map, Scale 1:24,000, Contour Interval 10 Feet: Newfane, New York.

U.S. Department of the Interior, Geological Survey. (1965). 7.5-Minute Series Topographic Map, Scale 1:24,000, Contour Interval 10 Feet: Ransomville, New York.

U.S. Department of the Interior, Geological Survey. (1965). 7.5-Minute Series Topographic Map, Scale 1:24,000, Contour Interval 10 Feet: Tonawanda, New York.

U.S. Department of the Interior, Geological Survey. (1965). 7.5-Minute Series Topographic Map, Scale 1:24,000, Contour Interval 10 Feet: Tonawanda East, New York.

U.S. Department of the Interior, Geological Survey. (1965). 7.5-Minute Series Topographic Map, Scale 1:24,000, Contour Interval 10 Feet: Tonawanda West, New York.

U.S. Department of the Interior, Geological Survey. (1965). 7.5-Minute Series Topographic Map, Scale 1:24,000, Contour Interval 10 Feet: Wilson, New York.

U.S. Department of the Interior, Geological Survey. (1965). 7.5-Minute Series Topographic Map, Scale 1:24,000, Contour Interval 20 Feet: Wolcottsville, New York.

U.S. Department of the Interior, Geological Survey. (1949). 7.5-Minute Series Topographic Map, Scale 1:24,000, Contour Interval 10 Feet: Medina, New York.

U.S. Department of the Interior, Geological Survey. (Undated). Determination of Approximate 100-Year Flood Boundaries for Streams in New York State. Washington, D.C.

U.S. Department of the Interior, Geological Survey. (Unpublished). Normal Depth Curve for Upper New York State.

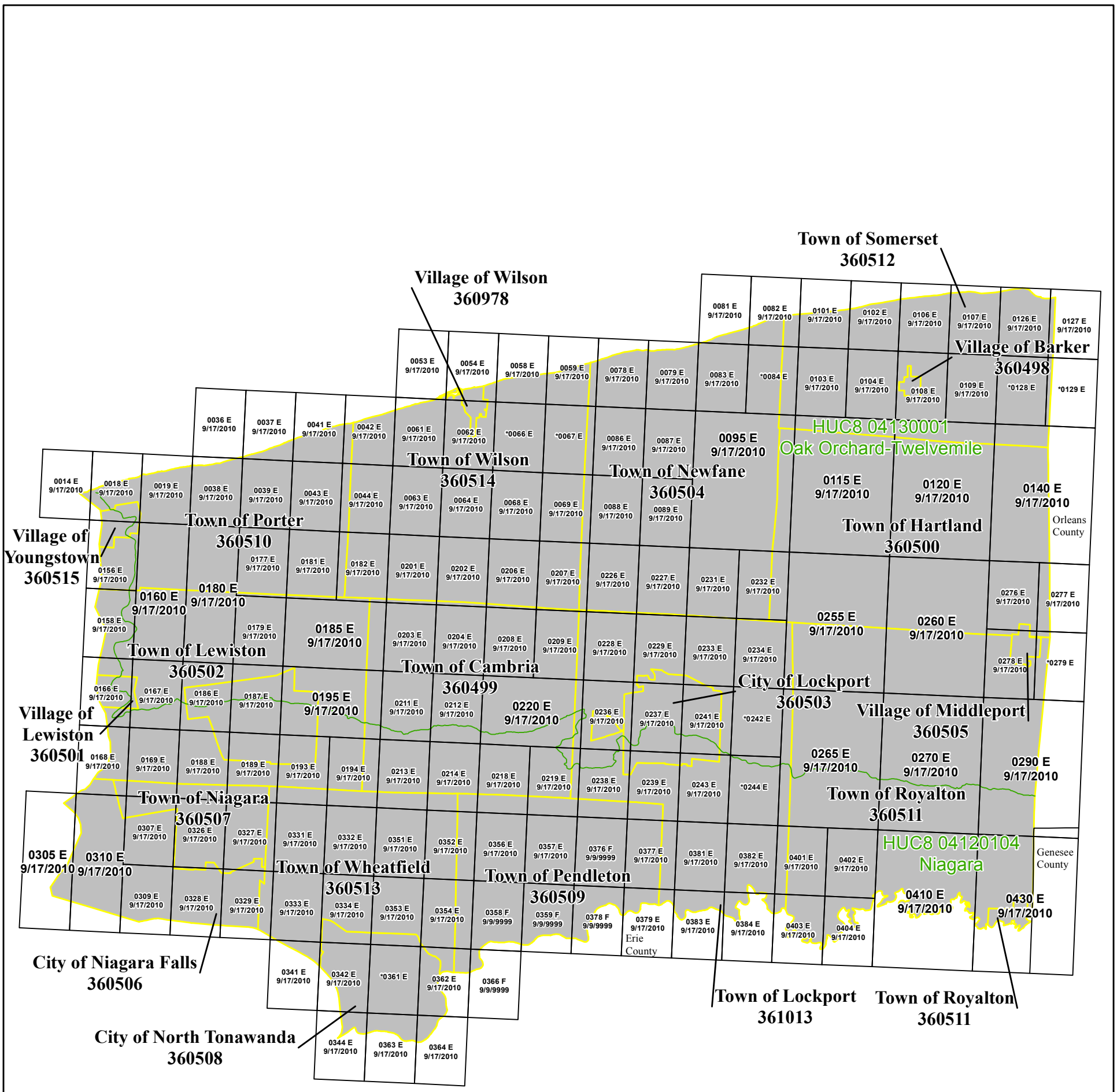
Water Resources Council. (March 1976). Guidelines for Determining Flood Flow Frequency, Bulletin 17. Washington, D.C.

Wendel Associates. (September 1971). Project No. 1275-2-71, Lockport Pendleton Drainage Report for the Town of Lockport and City of Lockport.

CRA Infrastructure & Engineering, Inc. Ref. No. 630641 (3). (August 2012). Floodplain Hydraulic Analysis Tonawanda Creek, Town of Pendleton, Niagara County, NY.

APPENDIX A – FIRM Panel Index, Listing of NFIP Jurisdictions, Map Repositories, FIRM Notes to Users and Map Legend for FIRM

FIGURE 2 - FIRM PANEL INDEX




**ATTENTION:** The corporate limits shown on this FIRM Index are based on the best information available at the time of publication. As such, they may be more current than those shown on FIRM panels issued before 8/8/8888

N

1 inch = 3.5 miles

0 1.75 3.5 7 Miles

Map Projection:
NAD 1983 UTM Zone 18N
North American Datum of 1983

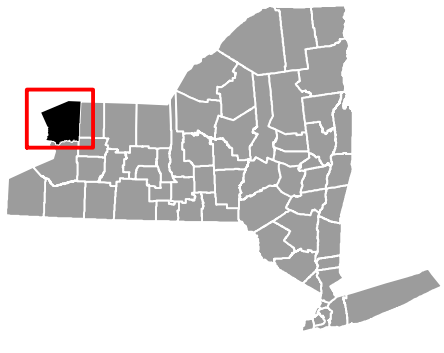
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

**HTTP://MSC.FEMA.GOV**

SEE FIS REPORT FOR ADDITIONAL INFORMATION

* NO SPECIAL FLOOD HAZARD AREAS

COUNTY LOCATOR



# NATIONAL FLOOD INSURANCE PROGRAM

## FLOOD INSURANCE RATE MAP INDEX

## NIAGARA COUNTY, NEW YORK (ALL JURISDICTIONS)

**PANELS PRINTED:**
0014, 0018, 0019, 0036, 0037, 0038, 0039, 0041, 0042, 0043, 0044, 0053, 0054, 0058, 0059, 0061, 0062, 0063, 0064, 0068, 0069, 0078, 0079, 0081, 0082, 0083, 0086, 0087, 0088, 0089, 0095, 0101, 0102, 0103, 0104, 0106, 0107, 0108, 0109, 0115, 0120, 0126, 0127, 0140, 0156, 0158, 0160, 0166, 0167, 0168, 0169, 0177, 0179, 0180, 0181, 0182, 0185, 0186, 0187, 0188, 0189, 0193, 0194, 0195, 0201, 0202, 0203, 0204, 0206, 0207, 0208, 0209, 0211, 0212, 0213, 0214, 0218, 0219, 0220, 0226, 0227, 0228, 0229, 0231, 0232, 0233 ,0234, 0236, 0237, 0238, 0239, 0241, 0243, 0255, 0260, 0265, 0270, 0276, 0277, 0278, 0290, 0305, 0307, 0309, 0310, 0326, 0327, 0328, 0329, 0331, 0332, 0333, 0334, 0341, 0342, 0344, 0351, 0352, 0353, 0354, 0356, 0357, 0358, 0359, 0362, 0363, 0364, 0366, 0376, 0377, 0378, 0379, 0381, 0382, 0383, 0384, 0401, 0402, 0403, 0404, 0410, 0430

FEMA

MAP NUMBER
36063CIND0B

MAP REVISED

TABLE 11: LISTING OF NFIP JURISDICTIONS

| Community | CID | HUC-8 Sub-Basin(s) | Located on FIRM Panel(s) | If Not Included, Location of Flood Hazard Data |
|---|---|---|---|---|
| Village of Barker | 360498 | 04130001 | 3603C0108E | |
| Town of Cambria | 360499 | 04120104, 04130001 | 3603C0182E, 3603C0185E, 3603C0194E, 3603C0195E, 3603C0201E, 3603C0202E, 3603C0203E, 3603C0204E, 3603C0206E, 3603C0207E, 3603C0208E, 3603C0209E, 3603C0211E, 3603C0212E, 3603C0213E, 3603C0214E, 3603C0218E, 3603C0219E, 3603C0220E | |
| Town of Hartland | 360500 | 04130001 | 3603C0095E, 3603C0115E, 3603C0120E, 3603C0140E, 3603C0232E, 3603C0234E, 3603C0255E, 3603C0260E, 3603C0276E, 3603C0277E, 3603C0278E, 3603C0279E[1] | |
| Town of Lewiston | 360502 | 04120104, 04130001 | 3603C0156E, 3603C0158E, 3603C0160E, 3603C0166E, 3603C0167E, 3603C0168E, 3603C0169E, 3603C0177E, 3603C0179E, 3603C0180E, 3603C0181E, 3603C0182E, 3603C0185E, 3603C0186E, 3603C0187E, 3603C0188E, 3603C0189E, 3603C0193E, 3603C0194E, 3603C0195E | |
| City of Lockport | 360503 | 04120104, 04130001 | 3603C0229E, 3603C0233E, 3603C0236E, 3603C0237E, 3603C0238E, 3603C0239E, 3603C0241E, 3603C0243E | |

TABLE 11: LISTING OF NFIP JURISDICTIONS *(continued)*

| Community | CID | HUC-8 Sub-Basin(s) | Located on FIRM Panel(s) | If Not Included, Location of Flood Hazard Data |
|---|---|---|---|---|
| Town of Lockport | 361013 | 04120104, 04130001 | 3603C0207E, 3603C0209E, 3603C0219E, 3603C0220E, 3603C0226E, 3603C0227E, 3603C0228E, 3603C0229E, 3603C0231E, 3603C0233E, 3603C0234E, 3603C0236E, 3603C0237E, 3603C0238E, 3603C0239E, 3603C0241E, 3603C0242E[1], 3603C0243E, 3603C0244E[1], 3603C0255E, 3603C0265E, 3603C0377E, 3603C0379E, 3603C0381E, 3603C0382E, 3603C0383E, 3603C0384E, 3603C0401E, 3603C0403E | |
| Village of Middleport | 360505 | 04130001 | 3603C0276E, 3603C0278E, 3603C0279E[1] | |
| Town of Newfane | 360504 | 04130001 | 3603C0059E, 3603C0067E[1], 3603C0069E, 3603C0078E, 3603C0079E, 3603C0081E, 3603C0082E, 3603C0083E, 3603C0084E[1], 3603C0086E, 3603C0087E, 3603C0088E, 3603C0089E, 3603C0095E, 3603C0207E, 3603C0226E, 3603C0227E, 3603C0231E, 3603C0232E, 3603C0233E, 3603C0234E | |
| City of Niagara Falls | 360506 | 04120104 | 3603C0168E, 3603C0305E, 3603C0307E, 3603C0309E, 3603C0310E, 3603C0326E, 3603C0327E, 3603C0328E, 3603C0329E | |
| Town of Niagara | 360507 | 04120104 | 3603C0168E, 3603C0169E, 3603C0188E, 3603C0189E, 3603C0307E, 3603C0310E, 3603C0326E, 3603C0327E, 3603C0328E, 3603C0329E | |
| City of North Tonawanda | 360508 | 04120104 | 3603C0334E, 3603C0342E, 3603C0344E, 3603C0353E, 3603C0354E, 3603C0361E[1], 3603C0362E, 3603C0363E, 3603C0364E | |

TABLE 11: LISTING OF NFIP JURISDICTIONS *(continued)*

| Community | CID | HUC-8 Sub-Basin(s) | Located on FIRM Panel(s) | If Not Included, Location of Flood Hazard Data |
|---|---|---|---|---|
| Town of Pendleton | 360509 | 04120104 | 3603C0214E, 3603C0218E, 3603C0219E, 3603C0238E, 3603C0239E, 3603C0352E, 3603C0354E, 3603C0356E, 3603C0357E, 3603C0358F, 3603C0359F, 3603C0362E, 3603C0366F, 3603C0376F, 3603C0377E, 3603C0378F, 3603C0379E | |
| Town of Porter | 360510 | 04120104, 04130001 | 3603C0014E, 3603C0018E, 3603C0019E, 3603C0036E, 3603C0037E, 3603C0038E, 3603C0039E, 3603C0041E, 3603C0042E, 3603C0043E, 3603C0044E, 3603C0156E, 3603C0158E, 3603C0160E, 3603C0177E, 3603C0180E, 3603C0181E, 3603C0182E | |
| Town of Royalton | 360511 | 04120104, 04130001 | 3603C0255E, 3603C0260E, 3603C0265E, 3603C0270E, 3603C0278E, 3603C0279E[1], 3603C0290E, 3603C0401E, 3603C0402E, 3603C0403E, 3603C0404E, 3603C0410E, 3603C0430E | |
| Town of Somerset | 360512 | 04130001 | 3603C0082E, 3603C0084E[1], 3603C0095E, 3603C0101E, 3603C0102E, 3603C0103E, 3603C0104E, 3603C0106E, 3603C0107E, 3603C0108E, 3603C0109E, 3603C0115E, 3603C0120E, 3603C0126E, 3603C0127E, 3603C0128E[1], 3603C0129E[1], 3603C0140E | |
| Town of Wheatfield | 360513 | 4120104 | 3603C0189E, 3603C0193E, 3603C0194E, 3603C0213E, 3603C0214E, 3603C0327E, 3603C0329E, 3603C0331E, 3603C0332E, 3603C0333E, 3603C0334E, 3603C0341E, 3603C0342E, 3603C0351E, 3603C0352E, 3603C0353E, 3603C0354E, 3603C0362E | |

TABLE 11: LISTING OF NFIP JURISDICTIONS *(continued)*

| Community | CID | HUC-8 Sub-Basin(s) | Located on FIRM Panel(s) | If Not Included, Location of Flood Hazard Data |
|---|---|---|---|---|
| Town of Wilson | 360514 | 04130001 | 3603C0042E, 3603C0044E, 3603C0053E, 3603C0054E, 3603C0058E, 3603C0059E, 3603C0061E, 3603C0062E, 3603C0063E, 3603C0064E, 3603C0066E[1], 3603C0067E[1], 3603C0068E, 3603C0069E, 3603C0182E, 3603C0201E, 3603C0202E, 3603C0206E, 3603C0207E | |
| Village of Wilson | 360978 | 04130001 | 3603C0054E, 3603C0062E | |
| Village of Youngstown | 360515 | 04120104, 04130001 | 3603C0018E, 3603C0019E, 3603C0156E | |

[1] Panel Not Printed

TABLE 12: MAP REPOSITORIES

| Community | Address | City | State | Zip Code |
|---|---|---|---|---|
| Barker, Village of | Barker Village Hall<br>8708 Main Street | Barker | NY | 14012 |
| Cambria, Town of | Cambria Town Hall<br>4160 Upper Mountain Road | Sanborn | NY | 14132 |
| Hartland, Town of | Hartland Town Hall<br>8942 Ridge Road | Gasport | NY | 14067 |
| Lewiston, Town of | Lewiston Town Hall<br>1375 Ridge Road | Lewiston | NY | 14092 |
| Lockport, City of | Lockport Municipal Building<br>One Locks Plaza | Lockport | NY | 14094 |
| Lockport, Town of | Lockport Annex Builgind<br>6560 Dysinger Road | Lockport | NY | 14094-7970 |
| Middleport, Village of | Middleport Village Hall<br>24 Main Street | Middleport | NY | 14105 |
| Newfane, Town of | Newfane Town Hall<br>2896 Transit Road | Newfane | NY | 14108-9705 |
| Niagara Falls, City of | Niagara Falls City Hall<br>745 Main Street | Niagara Falls | NY | 14305 |
| Niagara, Town of | Niagara Town Hall<br>7105 Lockport road | Niagara Falls | NY | 14305 |
| North Tonawanda, City of | North Tonawanda City Hall<br>216 Payne Avenue | North Tonawanda | NY | 14120 |
| Pendleton, Town of | Pendleton Town Hall<br>6570 Campbell Boulevard | Lockport | NY | 14094-9229 |
| Porter, Town of | Porter Town Hall<br>3265 Creek Road | Youngstown | NY | 14174 |
| Royalton, Town of | Royalton Town Hall<br>5316 Royalton Center Road | Middleport | NY | 14105 |
| Somerset, Town of | Somerset Town Hall<br>8700 Haight Road | Barker | NY | 14012 |
| Wheatfield, Town of | Wheatfield Town Hall<br>2800 Church road | North Tonawanda | NY | 14120 |
| Wilson, Town of | Wilson Town Hall<br>375 Lake Street | Wilson | NY | 14172 |
| Wilson, Village of | Wilson Village Hall<br>375 Lake Street | Wilson | NY | 14172 |
| Youngstown, Villlage of | Youngstown Village Hall<br>240 Lockport Street | Youngstown | NY | 14174 |

FIGURE 3 – FIRM NOTES TO USERS

FIGURE 3 – FIRM NOTES TO USERS

# NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates, refer to Table 10 in this FIS Report.

To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

PRELIMINARY FIS REPORT: FEMA maintains information about map features, such as street locations and names, in or near designated flood hazard areas. Requests to revise information in or near designated flood hazard areas may be provided to FEMA during the community review period, at the final Consultation Coordination Officer's meeting, or during the statutory 90-day appeal period. Approved requests for changes will be shown on the final printed FIRM.

The map is for use in administering the NFIP. It may not identify all areas subject to flooding, particularly from local drainage sources of small size. Consult the community map repository to find updated or additional flood hazard information.

BASE FLOOD ELEVATIONS: For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management.

Coastal Base Flood Elevations shown on the map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the FIS Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on the FIRM.

FLOODWAY INFORMATION: Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the FIS Report for this jurisdiction.

FIGURE 3 – FIRM NOTES TO USERS *(continued)*

FLOOD CONTROL STRUCTURE INFORMATION: Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 " Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction

PROJECTION INFORMATION: The projection used in the preparation of the map was Universal Transverse Mercator (UTM) Zone 18. The horizontal datum was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

ELEVATION DATUM: Flood elevations on the FIRM are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

*NGS Information Services*
*NOAA, N/NGS12*
*National Geodetic Survey*
*SSMC-3, #9202*
*1315 East-West Highway*
*Silver Spring, Maryland 20910-3282*
*(301) 713-3242*

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table 10 of this FIS Report.

BASE MAP INFORMATION: Base map information shown on the FIRM was provided by the New York State Office of Cyber Security & Critical Infrastructure Coordination. This information was provided as 30-centimeter and 60-centimeter resolution natural color and 30-centimeter resolution color infrared orthoimagery from photography dated April 2005.

The map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map.

Corporate limits shown on the map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after the map was published, map users should contact appropriate community officials to verify current corporate limit locations.

FIGURE 3 – FIRM NOTES TO USERS *(continued)*

## NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within Niagara County, NY, corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table 10 of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.

FLOOD RISK REPORT: A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest risks. Although non-regulatory, the information provided within the FRR can assist communities in assessing and evaluating mitigation opportunities to reduce these risks. It can also be used by communities developing or updating flood risk mitigation plans. These plans allow communities to identify and evaluate opportunities to reduce potential loss of life and property. However, the FRR is not intended to be the final authoritative source of all flood risk data for a project area; rather, it should be used with other data sources to paint a comprehensive picture of flood risk.

FIGURE 4 – MAP LEGEND FOR FIRM

**SPECIAL FLOOD HAZARD AREAS:** *The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. See note for specific types. If the floodway is too narrow to be shown, a note is shown.*

| | |
|---|---|
|  | Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE) |
| Zone A | The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone. |
| Zone AE | The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone. |
| Zone AH | The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone. |
| Zone AO | The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the hydraulic analyses are shown within this zone. |
| Zone AR | The flood insurance rate zone that corresponds to areas that were formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood. |
| Zone A99 | The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone. |
| Zone V | The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone. |
| Zone VE | Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone. |
|  | Regulatory Floodway determined in Zone AE. |

FIGURE 4 – MAP LEGEND FOR FIRM *(continued)*

**OTHER AREAS OF FLOOD HAZARD**



Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.

Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined based on future-conditions hydrology. No base flood elevations or flood depths are shown within this zone.

Area with Reduced Flood Risk due to Levee: Areas where an accredited levee, dike, or other flood control structure has reduced the flood risk from the 1% annual chance flood.

**OTHER AREAS**



Zone D (Areas of Undetermined Flood Hazard): The flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.


Unshaded Zone X: Areas of minimal flood hazard.

**FLOOD HAZARD AND OTHER BOUNDARY LINES**




Flood Zone Boundary (white line on ortho-photography-based mapping; gray line on vector-based mapping)



Limit of Study

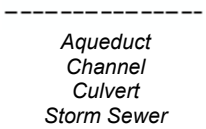


Jurisdiction Boundary

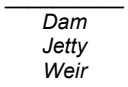


Limit of Moderate Wave Action (LiMWA): Indicates the inland limit of the area affected by waves greater than 1.5 feet

**GENERAL STRUCTURES**



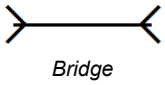

Channel, Culvert, Aqueduct, or Storm Sewer




Dam, Jetty, Weir



Levee, Dike, or Floodwall

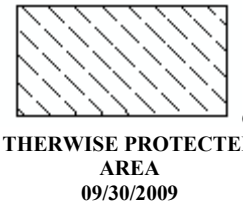



Bridge

FIGURE 4 – MAP LEGEND FOR FIRM *(continued)*

**COASTAL BARRIER RESOURCES SYSTEM (CBRS) AND OTHERWISE PROTECTED AREAS (OPA):** *CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.*


Coastal Barrier Resources System Area: Labels are shown to clarify where this area shares a boundary with an incorporated area or overlaps with the floodway.

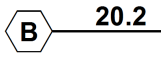



Otherwise Protected Area

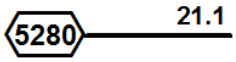
**REFERENCE MARKERS**


River mile Markers

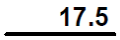
**CROSS SECTION & TRANSECT INFORMATION**



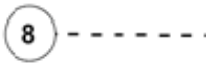

Lettered Cross Section with Regulatory Water Surface Elevation (BFE)




Numbered Cross Section with Regulatory Water Surface Elevation (BFE)




Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)



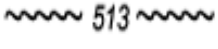

Coastal Transect



Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation.



Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.




Base Flood Elevation Line

**ZONE AE (EL 16)**

Static Base Flood Elevation value (shown under zone label)

**ZONE AO (DEPTH 2)**

Zone designation with Depth

**ZONE AO (DEPTH 2) (VEL 15 FPS)**

Zone designation with Depth and Velocity

FIGURE 4 – MAP LEGEND FOR FIRM *(continued)*

| **BASE MAP FEATURES** | |
|---|---|
| *Missouri Creek* | River, Stream or Other Hydrographic Feature |
| 234 | Interstate Highway |
| 234 | U.S. Highway |
| 234 | State Highway |
| 234 | County Highway |
| MAPLE LANE | Street, Road, Avenue Name, or Private Drive if shown on Flood Profile |
| *RAILROAD* | Railroad |
| ——————— | Horizontal Reference Grid Line |
| —— | Horizontal Reference Grid Ticks |
| + | Secondary Grid Crosshairs |
| Land Grant | Name of Land Grant |
| 7 | Section Number |
| R. 43 W. T. 22 N. | Range, Township Number |
| $^{42}76^{000m}$E | Horizontal Reference Grid Coordinates (UTM) |
| **365000 FT** | Horizontal Reference Grid Coordinates (State Plane) |
| **80° 16' 52.5"** | Corner Coordinates (Latitude, Longitude) |